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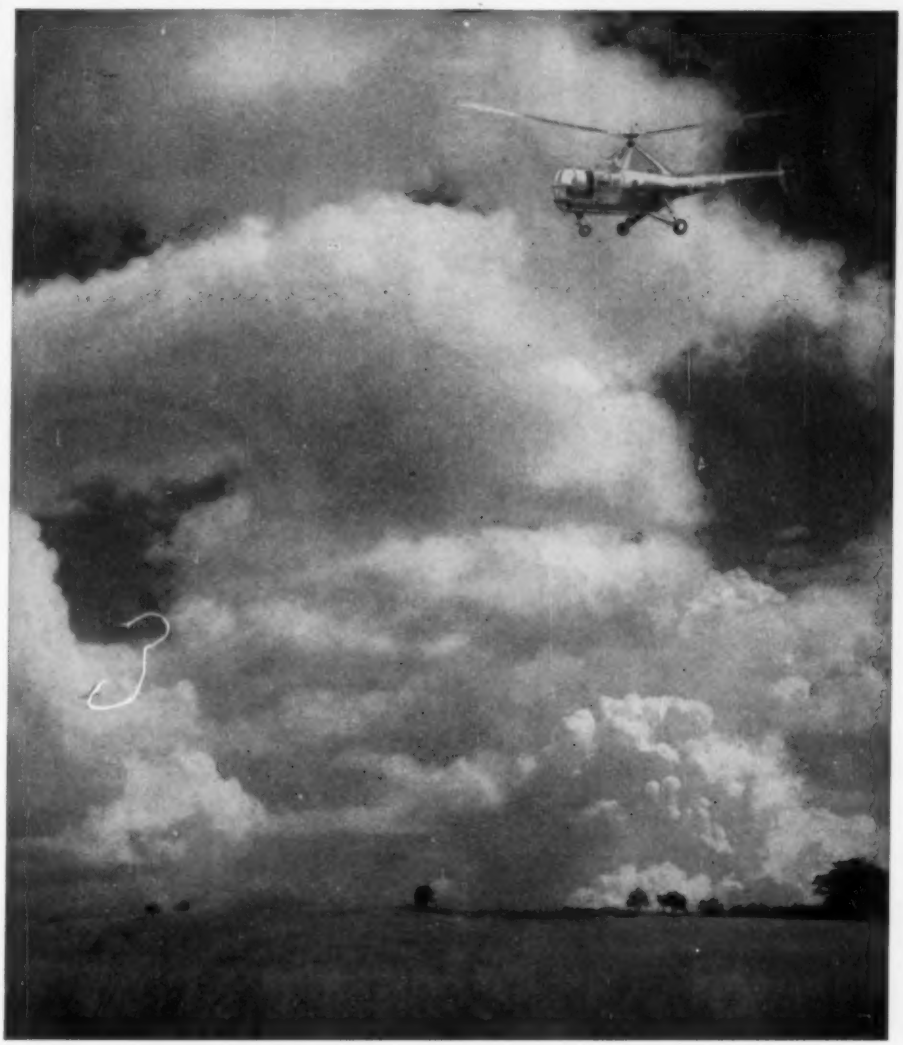

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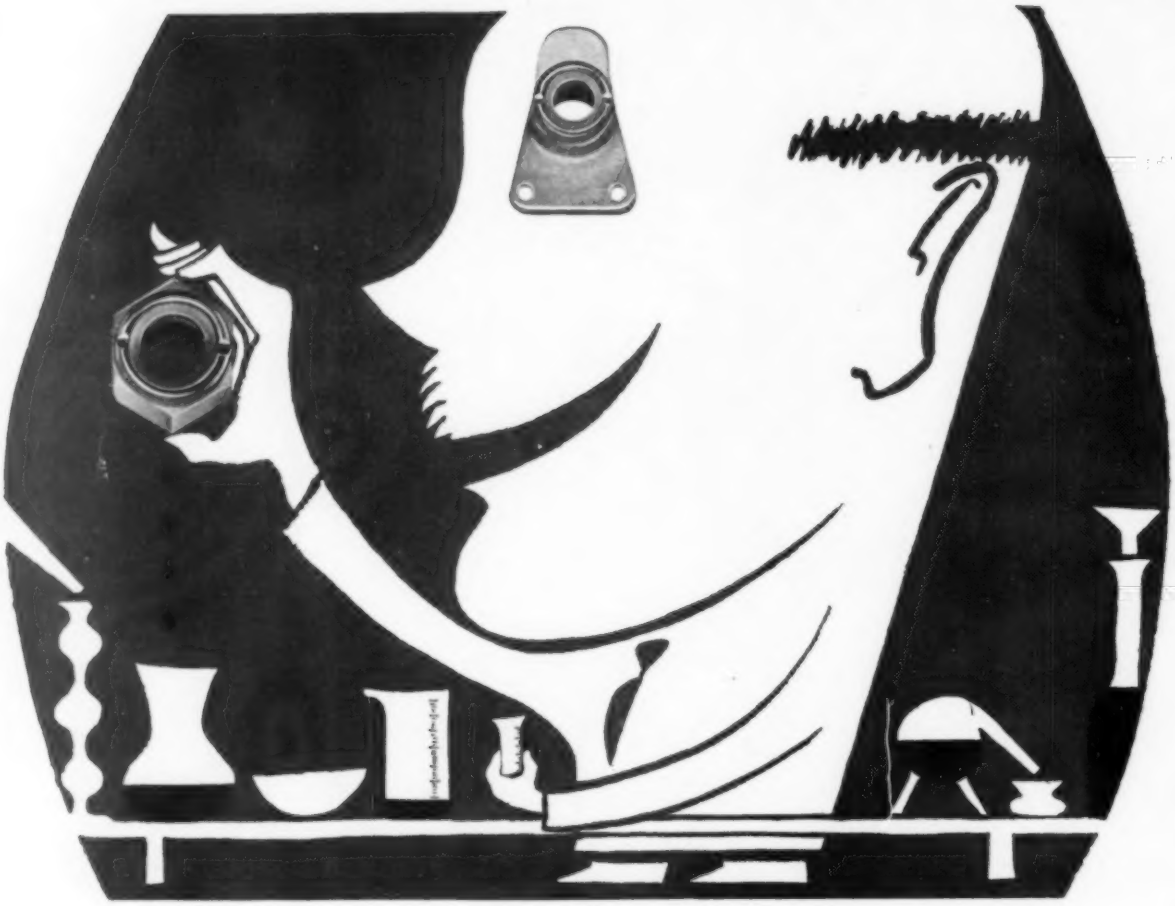

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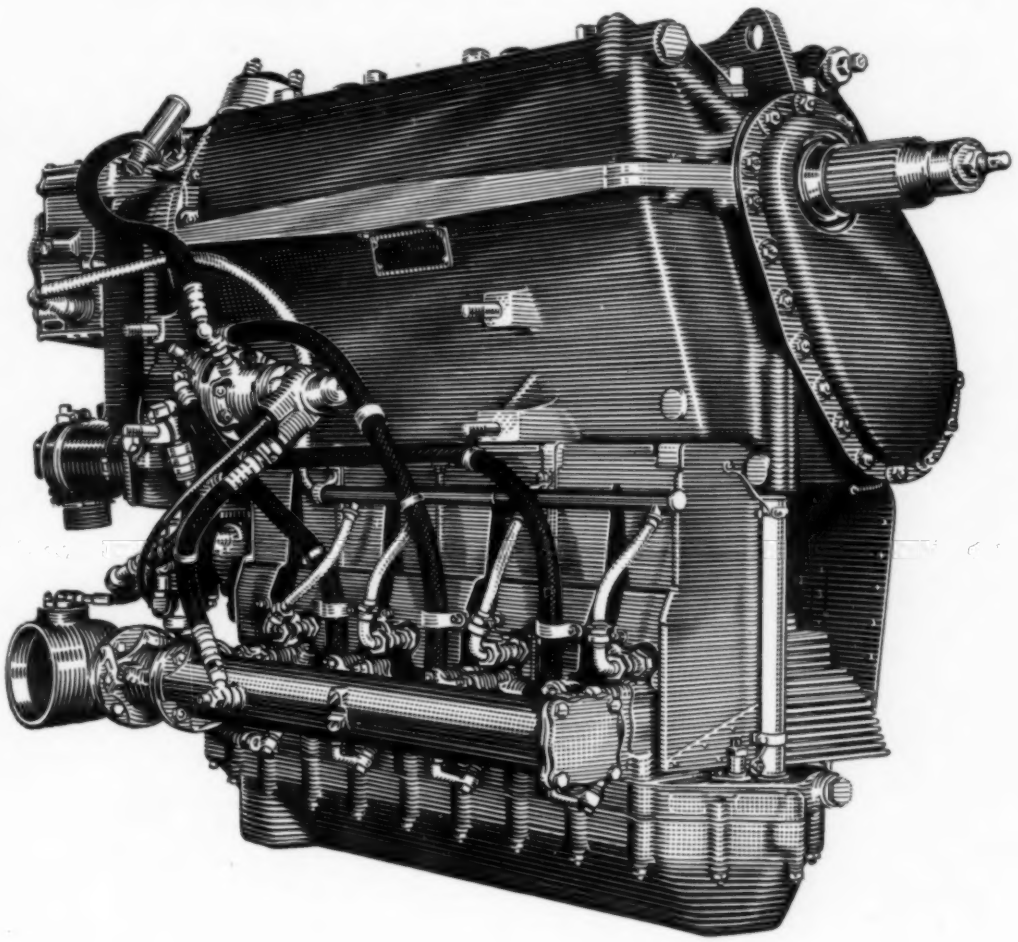

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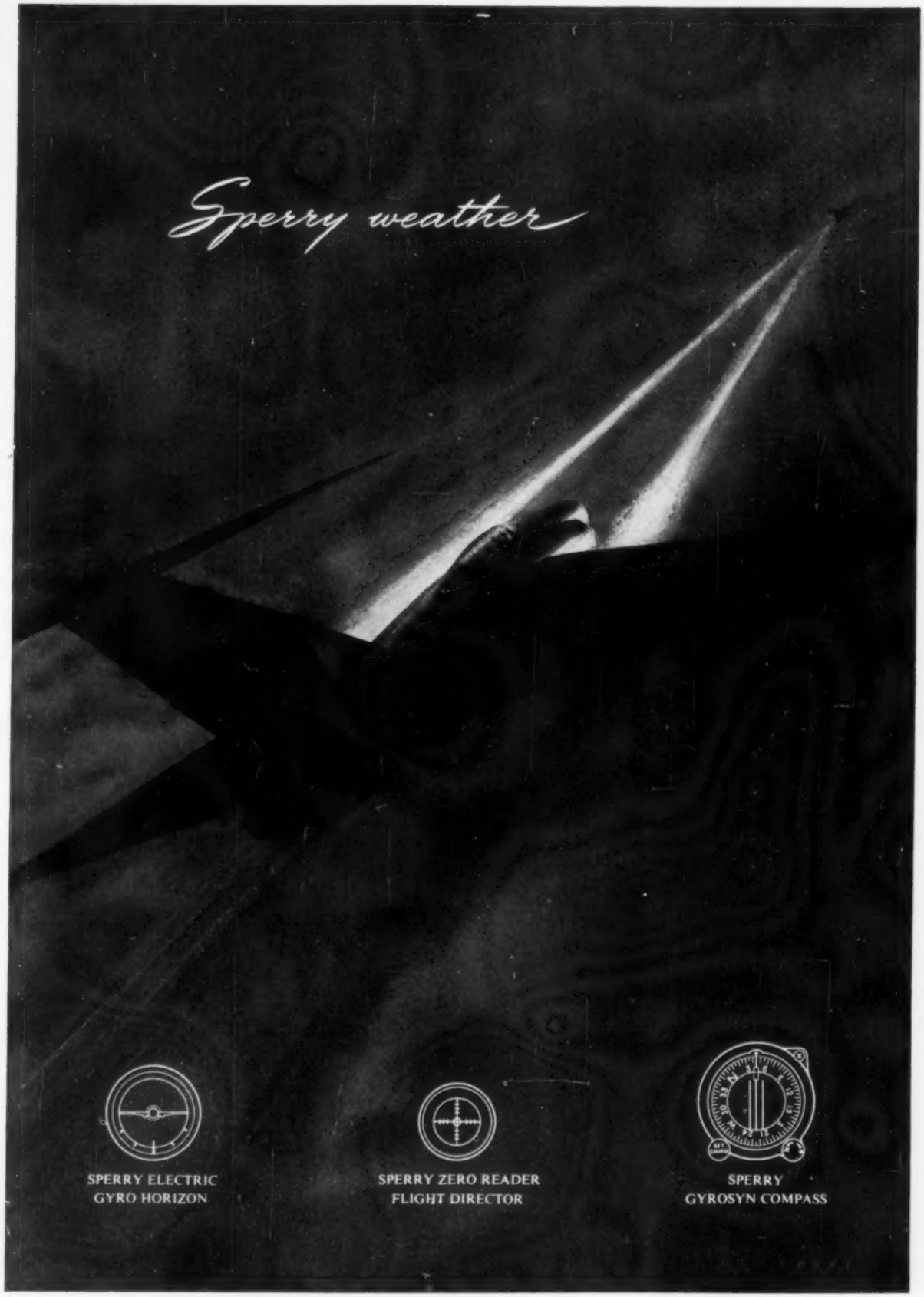
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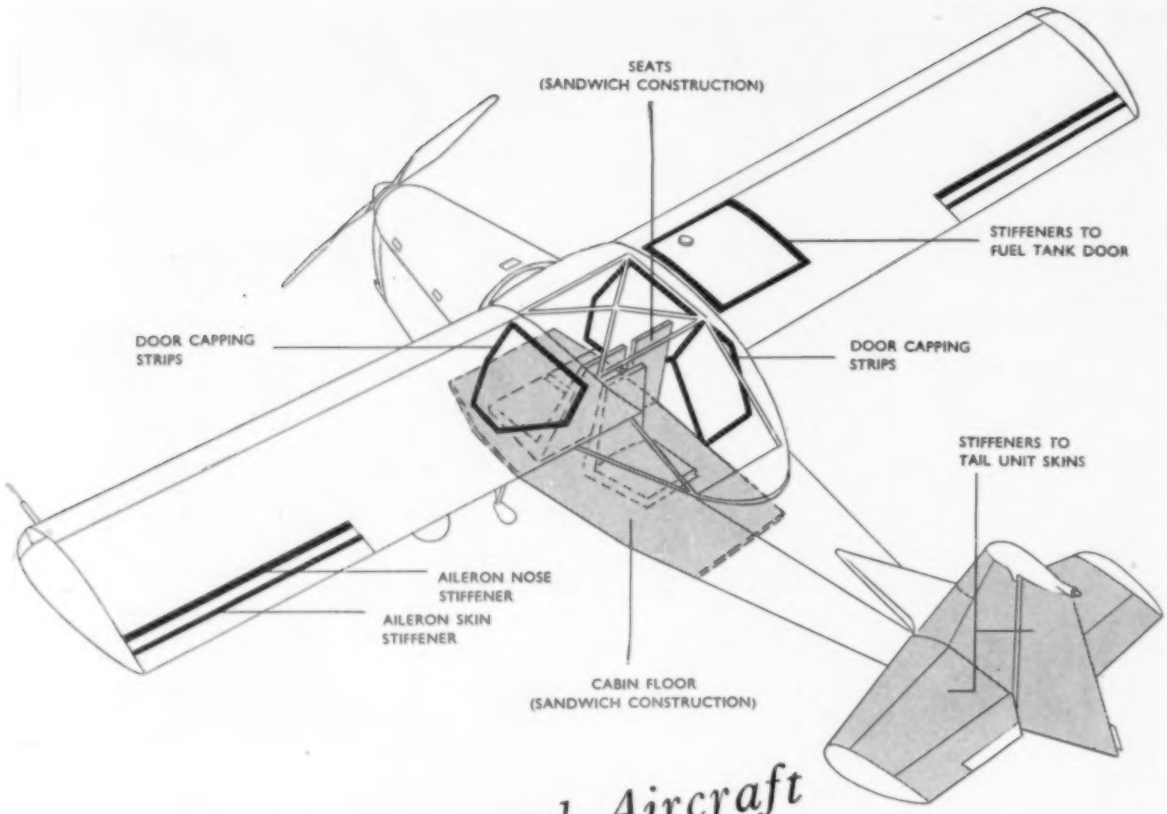

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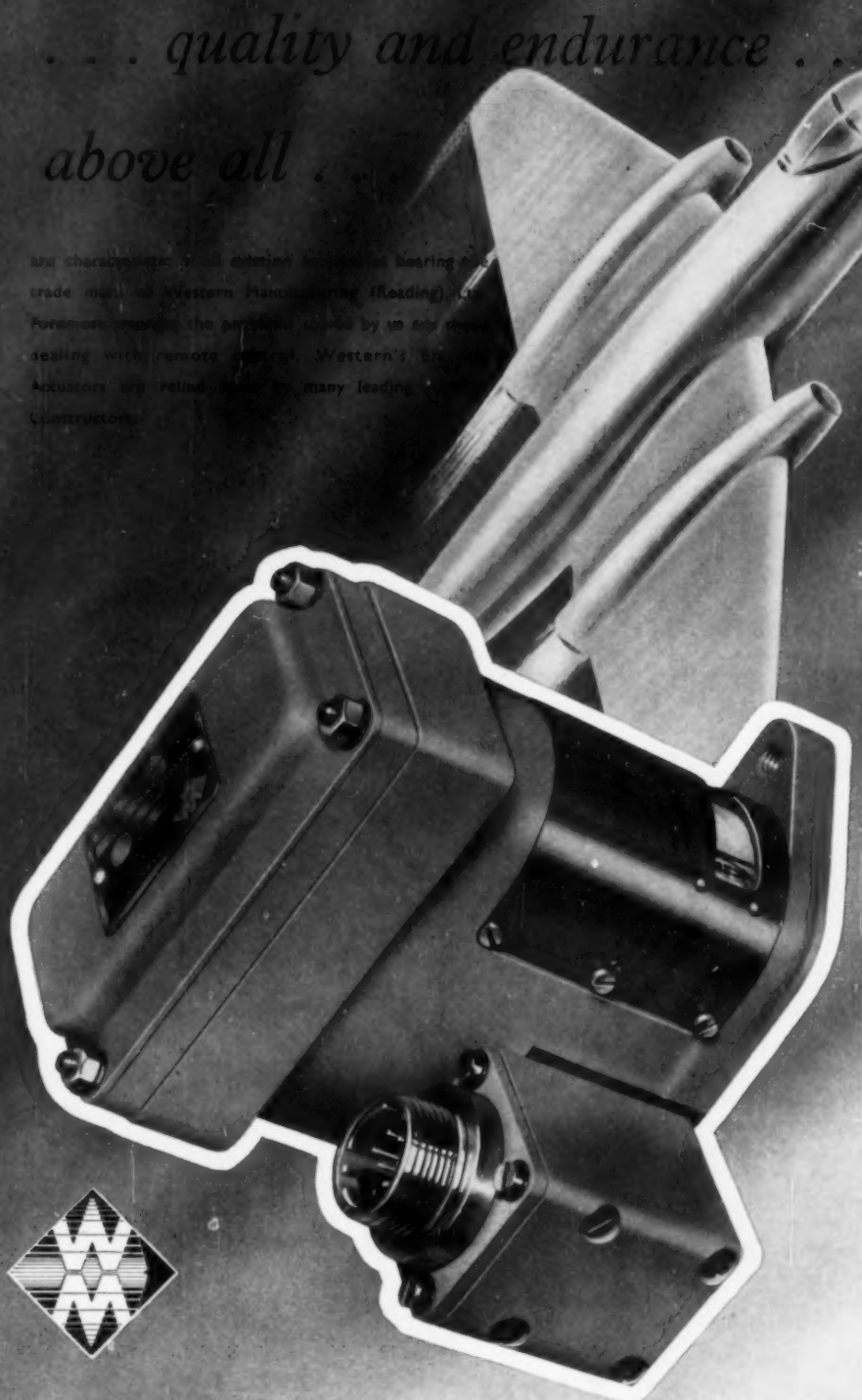

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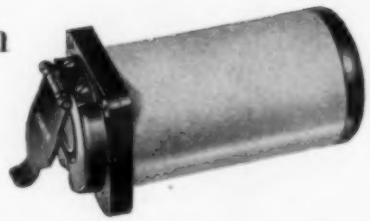

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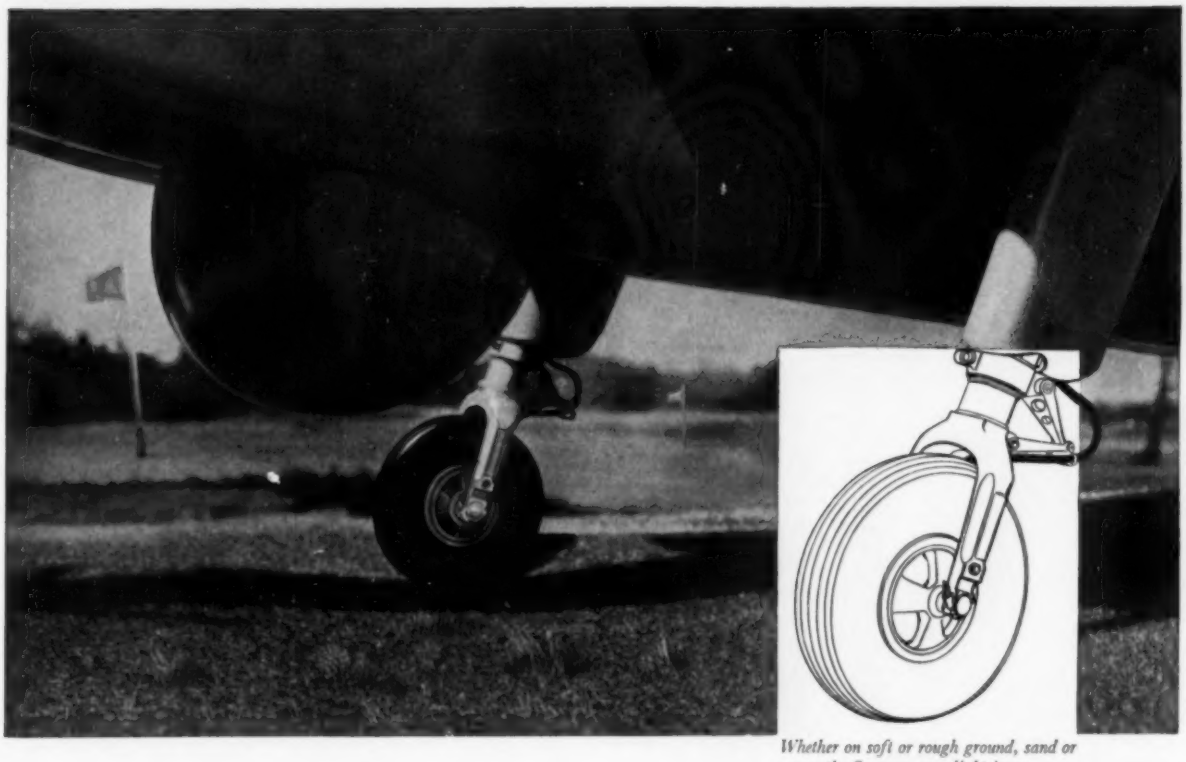
FROM YOUR NEWSAGENT NEXT THURSDAY 8d.

Golf course fairway — *Seamew* runway



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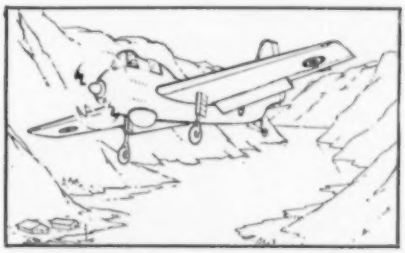
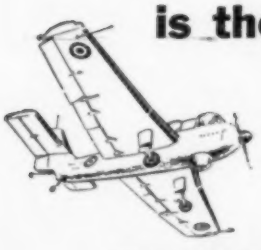
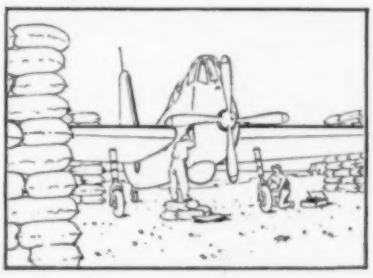


The extremely good handling characteristics of the Seamew combined with simplicity of construction and clear vision make it an excellent aircraft to fly, even for pilots with little experience of this type.

The *Short* answer is the *Seamew*



Economy of manufacture is paralleled by economy of maintenance, in terms of man-hours and spare components.



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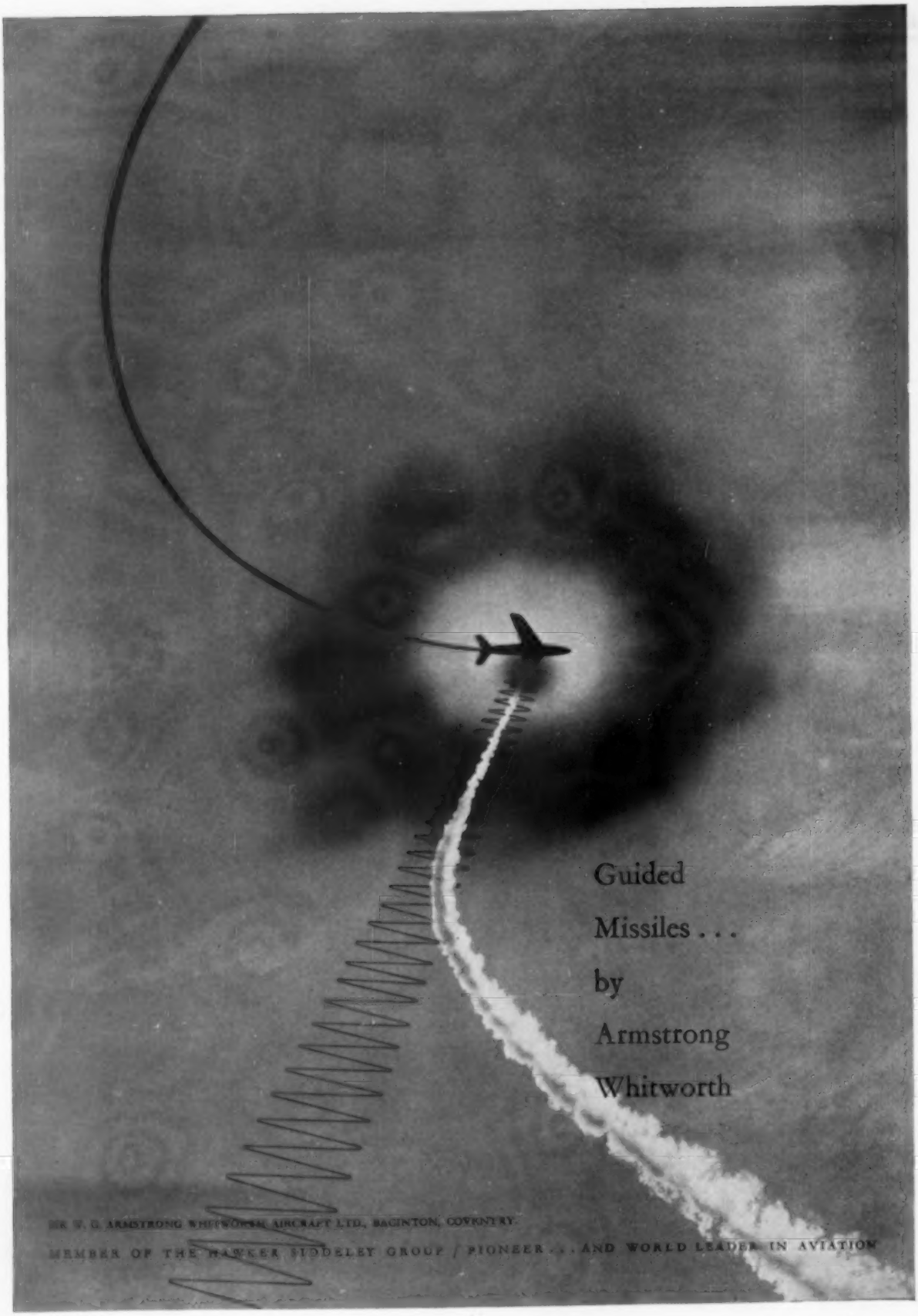
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First Aeronautical Weekly in the World

Founded 1909

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Too Many Hands Make Uneconomical Work

A SUBJECT of increasing importance is the co-ordination of effort in the development of purely military equipment for aircraft. For reasons of cost alone, duplication of effort among the Allied countries must be avoided. We have mentioned the matter to individuals in the industries at home and in America, and we have found them to be in agreement. This adds a special significance, we feel, to the announcement that while the Minister of Supply, Mr. Duncan Sandys, is in America (whence he is due to return in time for the re-assembly of Parliament on the 15th) to see something of weapon research and development and to exchange information, he will also discuss the possibilities of closer collaboration in this field.

It must be apparent to everyone that the cost of national defence has become almost insupportable. Even in America the talk shows signs of a swing towards the European outlook of "what *must* we have?—because we obviously cannot have everything we should like" rather than "we had better have some of those, and those, too—they will all come in useful." The Communist danger could easily become primarily one of Western financial collapse instead of the more-publicized violent kind. Even the most prosperous countries simply have to minimize the drain on their resources of materials, brain and brawn as well as of plain cash. It no longer makes sense for close allies to be working along parallel lines to develop certain kinds of very expensive equipment for the same purposes.

If this contention is accepted it is logical to look for ways of pooling resources and of avoiding any unnecessary overlap of work and expense. Fortunately there already exists between the two principal aircraft and armament-producing countries in the Western World a degree of understanding which would have been inconceivable a decade or so ago; no completely new principle would be involved, but rather an extension of present relationships.

Where, for example, aircraft and engines are concerned, ordinary commercial considerations cannot easily be set aside. And we are dealing with proud, powerful, vigorous and competitive peoples. Military aircraft are saleable commodities and, moreover, most types are also related in one way or another to civil designs bearing the same maker's names. But this cannot be said of high-altitude radar bomb-sights, of gun-laying radar, of missiles, and the variety of non-atomic bombs. It is this class of product that offers opportunities for great economies in resources, materials, the time of top-line scientists and, of course, pounds and dollars. Joint effort on each project might also be expected to result in earlier deliveries, and good timing is one of the most vital matters where new weapons and their counter-measures are concerned. We have remarked in the past, incidentally, that bombers lacking bomb-sights matched to their performance characteristics are, to say the least, badly handicapped. Today such equipment may take five or ten years to develop and the work may cost as much as £20m. What reason can there be for straining separately all our economies over such major items?

We believe that steps should be taken at once to increase Anglo-American collaboration. Each country has a great deal to offer the other. A start would be the mere listing of all wholly military equipment the standardization of which would be advantageous and acceptable from the development and production points of view. So far as existing equipment is concerned, national prides should here and there be set aside in favour of increased international standardization. If one design can be made to suit the requirement of all or most of the NATO countries, provided that there are proper safeguards and insurances, then the luxury of more than one must be forgone. In fact, it may not be so long before a similar course is intentionally accepted for some complete aircraft, although so far the state of the art, the somewhat different requirements, and the complication and importance of the products, have made it advisable for individual countries to order two or more aircraft to meet each of their own specifications.

Whenever British and American designers and other technicians have sat round a table together to exchange thoughts on their tasks, difficulties and aspirations, they have afterwards gone their ways convinced of the mutual benefit. An extension of this spirit to bring about a sharing-out of the work and of the products in place of the present duplication should be the next step. We hope that Mr. Sandys returns from his American visit thinking along these lines.

FROM ALL QUARTERS

Royal Heron

A GOOD many people in the know have, by agreement, been awaiting an official announcement before discussing the special de Havilland Heron which is nearing completion for H.R.H. the Duke of Edinburgh. No such announcement has as yet been made, but in view of a premature disclosure we now give some brief details.

The Heron will be of Series 2 type with retractable undercarriage, and it will have several important modifications to suit the Duke's requirements. The performance is likely to be much improved, partly by reason of the fitting of fully-feathering airscrews. The machine is expected to be delivered to, and maintained by, personnel of the Queen's Flight.

XFY-1 Airborne

AS reported previously in *Flight*, America has a very large-scale research programme for convertiplanes and other fixed-wing designs capable of vertical take-off. The two best-known of the latter are the Lockheed XFV-1 and the Convair XFY-1, both of which were illustrated in our issue of March 26th. They are under development for the United States Navy.

The Lockheed has already carried out a fair amount of test flying from a normal horizontal take-off, using a special trolley. The Convair is so designed (with a large ventral fin) that trolley take-offs are impracticable; consequently, it had not flown until this month, when genuine "pogo" take-offs were demonstrated inside an airship hangar at Moffet Field, California.

The XFY-1 was flown by Mr. J. F. "Skeets" Coleman, and it was stabilized—almost certainly to comply with regulations and not essential from the aerodynamic aspect—by cables attached to the tips of the fins and delta wing. No details have been given of the rig used, but it seems likely that the cables were unwound from drums placed on the hangar floor, with a fixed tension applied to prevent jerks.

The aircraft has an Allison double turboprop, driving two three-bladed counter-rotating airscrews. On opening up the engines, Coleman lifted the aircraft clear of the ground, and proceeded to climb steadily to about 60ft, the airscrews creating what was described as "a small cyclone." He then eased the XFY-1 back until its tail made contact with the ground, maintaining a vertical attitude throughout. The next test will be out of doors, and it should not be long before the aircraft is achieving horizontal flight.

Sabena Dakota Attacked

THE radio operator was killed and the captain and flight engineer seriously wounded in an attack by an "unidentified jet fighter" on a Dakota which, belonging to the Belgian Sabena company, was flying over the Austrian-Jugoslav border on June 3rd. The transport aircraft was on one of the "pig-lift" flights now being carried out from Blackbushe to Belgrade. After the attack, Capt. Douglas Wilson, the English co-pilot, took over the controls and made an emergency landing at Graz Airfield, in the British zone of Austria.

S/L. NEVILLE DUKE receives a replica of the Segrave Trophy—of which he now becomes holder—from Lord De L'Isle and Dudley, V.C., Secretary of State for Air. As we recorded last week, the Hawker chief test pilot received the award in recognition of his recent world air-speed record achievements in the Hunter.

The captain of the Dakota said that the attacking aircraft was a Mig-15 with Soviet markings, and that it most probably came from Hungarian territory. Capt. Wilson stated that he did not know the nationality of the fighter, but that it opened fire with cannon after circling the Dakota twice. Following the landing at Graz, a Jugoslav aircraft arrived there to complete delivery of the pedigree pigs to Belgrade.

This is the second incident of this kind. On December 31st last, it may be recalled, a Dakota of Eagle Aviation, returning from a "pig-lift" flight to Belgrade, was fired on by an "unidentified aircraft," but avoided damage by utilizing cloud cover.

Blowing the Gaff

THE May issue of *Aviation Age*, an American monthly journal, contains a number of detail drawings of the Curtiss Wright J65 turbojet—which is, of course, virtually identical with our own Armstrong Siddeley Sapphire. In Great Britain, the Sapphire can be placed on public view provided that no details

AUNT SALLY II: Mark 2 Jindivik target aircraft are in production at the Government Aircraft Factory at Fisherman's Bend. The plan form is as for the Mk 1 but the wings and tail surfaces are thinner and production is made easier by the reduction in double curvatures. A more powerful Armstrong Siddeley Viper is also fitted.

AVALON ASSEMBLY: The Australian Government Factory is mainly concerned with the production of Canberras, several examples of which are here seen being assembled after being transported in sections by road to the new £3 million airfield at Avalon, 34 miles from the factory in Melbourne.

ON THE UP AND UP: This striking formation shows D.H.C. Otters recently delivered to the Royal Canadian Air Force. The machines are used for a great variety of purposes, including rescue, ambulance, supply dropping, paratrooping, reconnaissance, communications, photography and spraying, in addition to their main rôle of personnel and cargo transport. The engine is a 600 h.p. P. and W. R-1340 Wasp geared radial.

of the interior of the engine are revealed. The American publication of these hitherto-secret details has not been timed to coincide with any parallel release of information on our own Sapphire, and we hope, therefore, to publish some of the material concerning the J65 in an early issue.

The drawings show that the Sapphire has 13 axial compressor stages, an annular combustion chamber and a two-stage turbine. The combustion chamber is of the vaporizing type, developed by Armstrong Siddeley's combustion research department, and employed in the Viper (*Flight*, August 7th, 1953). No fewer than 36 "walking-stick" burners are fitted. The two rows of turbine stator blades each have 108 blades, while the first and second turbine stages have 110 and 75 respectively.

Solo Achievement

LAST Friday, June 4th, Mr. Beverley Snook arrived in Darwin after a 27-day solo flight from England in a Proctor 4. On arrival he cabled home to Aerocontacts, Ltd., Gatwick (he is their overseas sales manager): "Made it—five hours over Timor." Except for a short delay at Bangkok to await a replacement part, his flight—which was to deliver the aircraft and to make business calls—was uneventful.

Goodyear Trophy at Shoreham

THOUGH there were earlier rumours of its cancellation, the Goodyear Trophy Race—formerly flown at Wolverhampton—is definitely to be contested at Shoreham Airport on Saturday, August 28th. It is sponsored by the Goodyear Tyre and Rubber Co. (Great Britain), Ltd., by arrangement with F. G. Miles, Ltd., and the organizers are the Southern Aero Club, Shoreham, from whom entry forms can be obtained.

The course will be the 15-mile circuit which was introduced so successfully in a Shoreham race in September 1952. An international handicap for piston and jet aircraft, the race will be open to machines of up to 1,750 kg (3,858 lb) all-up weight. It will be the last event in which pilots can gain National Air Race Championship points for 1954.

Swift Powered-Control Fault?

FOLLOWING the recent grounding of Supermarine Swifts, Air Ministry investigations are stated to have indicated a failure in an electrical circuit connected with the powered-control system. The Swifts, which went into R.A.F. service in February, were grounded last month after the inquiry into a fatal accident which occurred to one machine when flying from Waterbeach. The pilot was F/O. N. H. Thornton.

A modification to correct the fault is now being incorporated in the machines by the manufacturers, and will be flight-tested soon. The Air Ministry states that release of the Swifts from grounding will depend on the proving of this new installation.

Noise Complaints: Order in Council

THERE have been several instances during recent months of local authorities and individuals protesting against engine-noise from airfields and test establishments. At least one of these protests recently became the subject of legal action, when Col. T. H. du Boulay, who has a farm adjoining Dunsfold Aerodrome—where Hawker Aircraft test their Hunters—applied for a writ against that company on the grounds of "common nuisance."

Hawkers signed an agreement assuring Col. du Boulay that the "nuisance" would be reduced by all technical means possible, and he thereupon withdrew the writ. Then, within 12 hours of the company signing the document, the Ministry of Civil Aviation announced that an Order in Council had been made whereby manufacturers' airfields would be brought under the protection of Section 41 of the Civil Aviation Act, 1949, by which for the past five years military and M.T.C.A.-licensed aerodromes have been absolved from public legal action on the score of noise or vibration. The object, it is understood, is to prevent interference with the production of military aircraft.

At the same time, it is officially stated that the Government attaches great importance to the possibilities of reducing aircraft noise on the ground, and that research to this end is progressing in industrial and Government establishments.

In their agreement with Col. du Boulay, Hawker Aircraft had promised to install deflector screens and other equipment calculated to reduce, so far as possible, jet efflux noise.

AID BY AIR: Dr. Allan Vickers, senior medical officer of the Australian Flying Doctor Service, who, as reported here, is in Britain. This picture, taken at Australia House last week, shows the doctor (right) with Mrs. Vickers and the Australian High Commissioner, Sir Thomas White, formerly the Commonwealth's Minister for Air and Civil Aviation. On the table is one of the radio sets by which the "outback" homesteads summon aid, together with the first-aid pack which is kept in each home.

"Flying Doctor" Here

NOW in England to take a post-graduate course is Dr. Allan Vickers, of Charleville, Queensland, senior medical officer of Australia's world-famous Flying Doctor Service. (It may be recalled that *Flight* for February 12th contained an article describing the work of the service.) During his visit—another purpose of which is to put his experience freely at the disposal of any other dominion or colonial authorities anxious to follow Australia's lead in airborne medical work—he hopes to visit two or three aircraft firms.

Dr. Vickers—an entertaining character with a fund of true adventure stories—tells us that, though finance is an ever-present problem, the Flying Doctor Service will soon have to consider replacements to its fleet. At present this consists mainly of faithful veterans—three Dragons, two Fox Moths and a Percival Gull, with three Drovers as more modern types. Performance requirements are rather specialized, chief among them being the ability to operate into and out of "pocket-handkerchief" landing-places with poor surfaces, often in extremely hot weather. Helicopters would in some ways be very suitable for the work of the Flying Doctor Service, but in their present state of development problems of range and operating cost arise.

VISCOUNTS for AMERICA

British Transports with Rolls-Royce Turboprops Ordered by Capital Airlines

THE biggest and best news of the British aircraft industry for a long time was last week's announcement of a United States airline's order for three Vickers-Armstrongs Viscounts, with an option on 37 more.

The manufacturer and the operator—Capital Airlines—stated jointly on June 3rd that the value of the total order, assuming that the option is taken up, would amount to $45m (£16m). The value of the three aircraft immediately sold, including spares, is some $3m—over £1m.

The probability of Capital's order has been an open secret for some weeks, and more than one reference to it has appeared in *Flight*. Nevertheless, one contract in Vicker's hands is undoubtedly worth an infinite number of unconfirmed reports.

The three Viscounts will be delivered in the first quarter of 1955—by courtesy of B.E.A. The Corporation has given up a place in the queue "in the national interest," as Vickers put it. Orders for Viscounts now top the hundred, and the Venezuelan airline L.A.V. have announced their intention to buy three more.

Similar in many respects to the improved model now in production for Trans-Canada Air Lines, the Capital Viscounts will have uprated Dart R.Da 3 turboprops giving a cruise output of 1,550 e.h.p. They are likely to be luxurious versions carrying about 40 passengers in four-abreast seating.

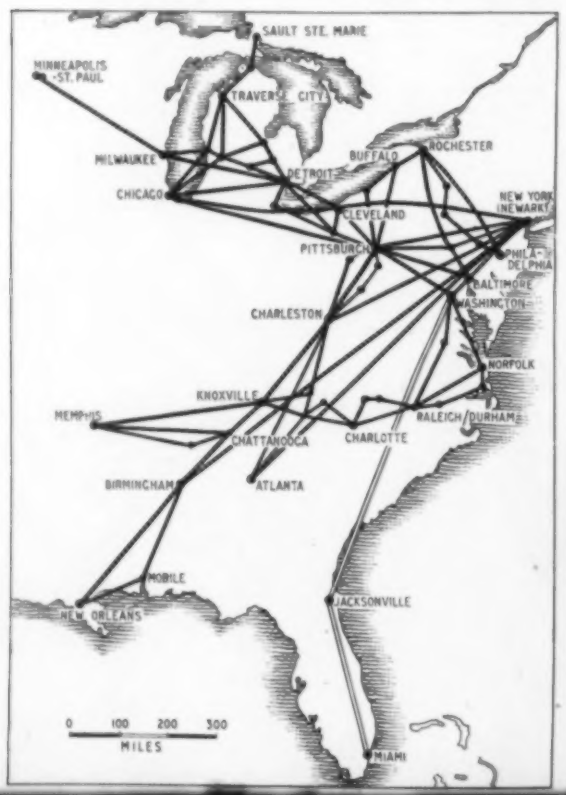
Capital Airlines at present operate a fleet of 12 Constellations, 25 DC-4s and 25 DC-3s over a 4,200-mile route network covering the eastern half of the United States. The airline's predecessors were formed 27 years ago, although the name Capital Airlines was not adopted until April 1948. Precise plans for operating Viscounts have not yet been announced. It may be assumed, however, that the turboprop airliners will take over services now operated by DC-3s and DC-4s, providing Capital with a lead over such competitors as T.W.A. and American Airlines—who use twin-engined Martins and Convairs respectively for their medium-stage routes. If the Viscount attracts domestic traffic in the way that it has for B.E.A. in Europe (and there seems no reason why it should not, in a nation where technological progress is so keenly appreciated), further American orders may be prompted.

Talking turbines: Key men involved in the Capital order were Mr. J. H. Carmichael (right), president of Capital Airlines, and Mr. G. R. Edwards, managing director of Vickers-Armstrongs, Ltd. (Aircraft Division).

On the basis of passengers carried, Capital Airlines rank fifth among U.S. domestic carriers. In 1953 the company carried nearly 2,250,000 passengers—about 100,000 more than the combined total flown on the scheduled services of all United Kingdom operators. If the option for 37 aircraft is taken up, their Viscount order will be the largest ever placed (B.E.A. have placed orders for 26 Series 701s and 12 "stretched" Series 801s).

Although details of the Capital-Vickers contract remains secret, it seems likely that the decision to sign the full contract for 40 depends on two factors: certification by the American Civil Aeronautics Authority; and satisfactory performance on American routes of the aircraft to be delivered early next year.

The question of certification is virtually *sub judice* at the moment. The Viscount has been under investigation by the C.A.A. since May 17th, when a four-man team opened discussions with the A.R.B. Consisting of the heads of the C.A.A.'s engineering, airframe and equipment, flight-test and power-plant branches, the team have flown in the Viscount, inspected the aircraft and its power-plants, and taken part in long talks with Vickers-Armstrongs, Rolls-Royce, B.E.A. and A.R.B. They were due to return to America two days ago, but some weeks at least will pass before a decision is announced. "Grapevine" reports suggest that, at the time of writing, no serious obstacles to U.S. certification of the Viscount have been discovered. For T.C.A. the granting of an American C. of A. would be desirable from a prestige viewpoint, if not essential, as they will be operating Viscounts into the United States by the beginning of next year. Comments on the Viscount order, and a note on Capital's president, Mr. J. H. Carmichael, appear on page 772.



Clinching the deal: The order is signed at Weybridge. From left to right are seen Mr. Charles H. Murchison, chairman of Capital Airlines' executive committee; Mr. J. H. Carmichael; Mr. R. G. Lochiel, vice-president treasurer, Capital Airlines; Sir James Reid Young, chairman of Vickers-Armstrongs, Ltd.; Mr. G. R. Edwards; Maj.-Gen. C. A. L. Dunphie, deputy chairman and managing director of Vickers-Armstrongs, Ltd., and Mr. R. P. H. Yapp, Vickers-Armstrongs' director. On the left is shown Capital's extensive route network.

AFRICAN ACCIDENT REPERCUSSIONS

Investigator's Criticisms Refuted by A.R.B. and S.B.A.C.

CRITICISMS of the Air Registration Board, the Society of British Aircraft Constructors and Vickers-Armstrongs, Ltd., are contained in the second of two official accident reports on the loss of a Central African Airways Viking in Tanganyika last year. Replies to the charges were quickly issued by the A.R.B. and the S.B.A.C., and their statements are reproduced on this page. The extent to which the charges are justified, if at all, may be judged from a review of events leading to the present situation.

The aircraft concerned, Viking VP-YEY, crashed at Mtara, in the Handeni district of Tanganyika, on March 29th, 1953, with the loss of all aboard—five crew and eight passengers. An inquiry into the accident was held at Dar-es-Salaam on April 28-29th, and an official report signed by Sir John Gray was published on June 1st, 1953. This report stated that the accident was caused by fracture of the starboard outer-plane spar boom as a result of metal fatigue cracks. These cracks, it was stated, had developed from corrosion nodes, due to the use of grease to specification D.T.D.577 during fitting of press-fit bolts to attach the outer to the inner spar-booms. Three assessors—Capt. C. W. Byas, Capt. G. D. Green and Capt. F. D. Greensted—added a postscript to the report in which they criticized the R.A.E. for anticipating the findings of the inquiry; they also urged that research into fatigue of aluminium alloys should be expedited by all possible means.

The criticism of the R.A.E. referred to the suggestion that D.T.D.577 brought about corrosion. Subsequently it transpired that this suggestion did not necessarily represent the full official views of the R.A.E., and that it had been expressed only in an inter-departmental memorandum. It was therefore decided to hold a second inquiry and this was again conducted by Sir John Gray with the same three assessors on December 15th-16th, 1953. Meanwhile, attempts had been made to determine by chemical analysis whether D.T.D.577 had in fact been used, but the results of this analysis were inconclusive. However, official evidence was given by the R.A.E. that the corrosion which led to fatigue was mainly due to the fact that the bolts were not cadmium-plated. The court concluded that an approved compound, D.T.D.369, had been used rather than D.T.D.577. The conclusion reached in the second report was that the Viking had been struck by a sudden gust, resulting in fracture of the lower starboard outer boom outboard of station 41 due to weakening of the boom at the bolt hole by metal fatigue cracks, and that the onset of fatigue failure at this spot had been advanced considerably by corrosion at the common surface of the aluminium alloy boom and the steel bolt.

REQUIREMENTS OF A.P.970

The report then asked, in effect, why the fitting of non-plated bolts was permitted, and attempted to fix responsibility for the insufficiency of the anti-corrosive measures taken. It noted that the Viking was built in 1946, and that in its construction Vickers were guided by the principles set out in A.P.970, the Air Ministry document specifying structural requirements for military aircraft. This contained a clause saying that, "in general," steel detail parts should receive treatment against corrosion. The report said also that at this time the S.B.A.C. were to have drawn up a chart listing methods of protection against corrosion but that this chart was never produced. Finally, it was suggested that the only other source of guidance to the manufacturer was the A.R.B. Requirement D.18, issue 2, of September 14th, 1945, which specifies, *inter alia*, that "all members of the primary structure shall be suitably protected against deterioration or loss of strength in service due to weather, corrosion, abrasion or other causes." Sir John Gray complained that this document "comes near to being purely platitudinous," and added: "It was suggested that the Board could not be held responsible as the non-preparation of the proposed chart rested with the S.B.A.C. as well as the responsibility for any consequences which may have resulted from this omission. I can see no great reason for this apparent self-complacency on the part of the Board. It appears perfectly obvious to me that either they should have insisted on the Society producing such a chart or else have taken other measures to ensure that such a chart was forthcoming. Indirectly their omission has led to the very tragic consequences and the Board must accept its proper share of responsibility for this."

The report absolved the manufacturers in the following terms:— "In the absence in 1946 of any detailed and definite instructions by the A.R.B. . . . as to the protection to be applied, and within the limits of the manufacturer's licence and of the discretion allowed under British Civil Airworthiness Requirements as set out in the leaflet D.18. . . . Vickers-Armstrongs, Ltd., were justified in their choice of design and assembly and anti-corrosion protection of the joint at station 41 [the point at which the spar boom failed]."

On the basis of these findings, the report urged the cessation of the system whereby the A.R.B. "delegates responsibility as to the fulfilment of the airworthiness requirements . . ." saying that the board should take "immediate steps to issue detailed explicit and mandatory instructions as to the manufacture of British civil aircraft."

When Central African Airways' Vikings were grounded after the accident, an inspection was made of the bolts used to attach outer wings to the inner spar-boom fitting. It was found that eleven wings had plated bolts top and bottom; seven had unplated bolts top and bottom; and two had both plated and unplated bolts. Since the drawing called for the use of unplated bolts, the manufacturers believed that the plated bolts had been fitted in error. In their postscript to the report, the assessors suggested that the fact that a high percentage of non-standard bolts were fitted in Vikings was a grave reflection on Vickers-Armstrongs' production methods. They also criticized the operator, C.A.A., for not showing a more active interest in problems of fatigue failure.

On May 26th, 1954, the Director-designate of Civil Aviation for the Federation of Rhodesia and Nyasaland, published his comments on the two accident reports, and pointed out a number of alleged technical errors contained in them—*e.g.*, that D.T.D.369 is not a grease as stated but a pigmented-varnish joint compound. The Director-designate's comments also referred to a previous occurrence of fatigue in a wing of a Central African Airways' Viking, evidently in order to prevent over-emphasis of the relationship between the two incidents.

INBOARD SPAR BOOMS

The first instance was in October 1951, when VP-YEW flew from Blantyre to Dar-es-Salaam in turbulent weather. During the flight a loud crack was heard but nothing was found when the aircraft was inspected on landing. Later, during a more thorough inspection at Salisbury, one of the inboard lower spar booms was found to be cracked. The component was flown back to England for inspection by Vickers-Armstrongs. On December 28th a notice was sent to Viking owners ordering an immediate inspection of all aircraft which had flown more than 5,000 hours and an inspection of other Vikings at the earliest possible moment. On January 17th, 1952, the life of the inboard lower spar boom of Vikings operated in tropical conditions was fixed at 5,000 hours, and a permanent system of precautionary inspections was initiated.

All these precautions referred to the inboard spar booms and no life had been fixed for the outboard booms. It may be noted that the Viking outboard spar has two booms, of which the lower —being subjected in flight (particularly in tropical conditions) to a large number of alternating tensile loads—is the more subject to fatigue failure. Ironically enough, it transpires that at the time of the accident the R.A.E. was conducting fatigue tests to determine the life of this very component, and the A.R.B. was on the point of fixing a provisional limit of 10,000 hours. The failure to VP-YEY occurred when it had flown 8,815 hours—clearly as a result of the increased stress concentrations, and consequent vulnerability to fatigue failure, produced by corrosion.

In focusing attention on the fatigue problem, and on the value of the experience gained from accident investigation, Sir John Gray's reports have been valuable. But, however deep the sincerity of his motives, the author shows a tendency to reach sweeping conclusions without, it would appear, having digested a mass of complex evidence, much of it highly technical. It would be no exaggeration to say that the Air Registration Board was astounded by the criticisms made in the second report. The Board's statement is as follows:—

"The findings and recommendations of the Court appear to indicate a considerable misconception of the functions and methods of the A.R.B. and a very understandable lack of knowledge of the Board's requirements, which is shown by the recommendation that

'The A.R.B. should produce at once the most detailed, explicit and mandatory instructions as to the manufacture of civil aircraft to ensure attainment of sound standards of manufacture, operation and performance of civil aircraft.'

"It must be observed that the only A.R.B. publication before the Court was Requirement D.18 which is in general terms stating the object, but leaving the method to basic engineering practice.

"On the other hand, in other fields such as structures and perform-

(*Concluded on page 773*)

"Flight" photographs

The general scene at Fairwood Common before the race started and (right) Canberra B.2s in line astern during their stimulating formation display.

Dunkerley Wins Welsh Air Derby

ONCE again Fred Dunkerley has literally pulled a fast one on the Royal Aero Club handicappers. On Saturday afternoon his familiar Cirrus-Gemini G-AKKB crossed the finishing line well ahead of 18 other competitors in the three-lap Welsh Air Derby, held at Fairwood Common by the Swansea and District Flying School and Club. Its owner received the D. M. Evans-Bevan 100-guinea Challenge Trophy, together with a cash prize of £100 and 22 points towards the 1954 British Air Racing Championship.

Swansea was spared the thundery downpours endured by many other southern regions on Saturday, and local enjoyment of the display and the race was little affected by menacing clouds and a chill breeze.

Four Canberra B.2s from Scampton provided a noisy and dramatic overture to the official opening by the Mayor of Swansea, Ald. T. S. Harris, and Mr. C. M. Colbeck, S.W. divisional controller, M.T.C.A. Led by S/L. Howard, the team performed some really excellent close-formation and solo work despite the bumps. The standard was maintained by eight Auxiliary pilots of No. 614 (County of Glamorgan) Squadron, flying Vampires and led by S/L. Spiers. The Vampire individual aerobatic show was by F/L. Clarke, who almost demonstrated a flick roll when recovering rather smartly from an inverted shallow dive. The Auxiliaries added an effective supplement to the printed programme by towing across the airfield a target flag bearing the message "Join 614 Squadron"; the tug was a Meteor 7.

With well over 100 jumps to his credit, parachutist Johnny Ralling made a descent that was a thoroughly professional job: he left the Auster at 2,500ft, swallow-dived for 12 seconds before taking silk and—by deft use of lift-webs—landed on a smallish patch of grass near the runway and in full view of the entire crowd. Arthur Jones, Swansea's C.F.I., ended the programme with a lively and very well assorted selection of Tiger Moth aerobatics.

The Air Derby attracted a varied field—three Tiger Moths, three Geminis, two Autocrats, two Proctors and a Swallow, Mosscraft, Messenger, Hawk Trainer, Hawk Major, Chipmunk, Nighthawk, Falcon Six and Hawk Speed Six. The race consisted of three laps of a 22.53-mile quadilateral covering most of the Gower peninsula. There were hopes of a local victory—perhaps for the little B.A. Swallow flown by Arthur Jones—but conditions favoured the faster aircraft. As the race progressed, general opinion favoured "Tim" Wood's Messenger, which moved up a place in the first lap. Practically all other overtaking took place out of sight in the last lap, and Dunkerley's runaway win took most spectators by surprise. There was a neck-and-neck tussle for second place between G/C. Grece (Nighthawk) and S/L. Rush (Falcon), and most other entrants—true to handicap form—finished in a great gaggle split-seconds later.

RESULTS

Pl.	Pilot	Reg.	Aircraft and engine	H'cap m. s.	Speed m.p.h.
1	F. Dunkerley	G-AKKB	Gemini (two Cirrus Minor)	18 26	165.0
2	G/C. C. M. M. Grece	G-AGWT	Nighthawk (Gipsy Six 2)	17 14	155.5
3	S/L. J. Rush	G-AECC	Falcon Six (Gipsy Six 1)	18 54	166.0
4	H. Wood	G-AKBO	Messenger (Cirrus Major 3)	10 55	125.5
5	G. R. I. Parker	G-AHWR	Proctor 5 (Gipsy Queen 2)	14 58	143.0
6	J. N. Somers	G-AKDN	Chipmunk (Gipsy Major 10C)	13 44	136.5

And the Weather Nearly Wins at Yeadon

THE big air display held on Whit-Monday each year at Yeadon Airfield, near Leeds, under the sponsorship of the *Yorkshire Evening News*, seems to have incurred the permanent displeasure of the Clerk of the Weather. In 1952 there was such a high wind that several items had to be cancelled; last year the heavens opened half-way through the programme; and this year there was an initial drizzle, followed by low cloud and poor visibility all the afternoon. In the circumstances, Air Chief Marshal Joubert, who organized and directed the show on behalf of the Soldiers', Sailors' and Airmen's Families Association—for which he is such an indefatigable worker—probably counted himself fortunate in attracting a crowd which early estimates put at no less than 50,000. At the same time, some top-rank international flying talent had been engaged, and expenses must have been heavy.

Monday's depressions, as it happened, were country-wide, with the result that a number of formations and individual aircraft which should have been present (including one carrying two members of *Flight's* staff) were kept firmly clamped at their bases.

Not being required to travel north under its own power, however, the 1909 Blériot from the Shuttleworth Collection was among those present, as were the 1912 Blackburn monoplane and the Blackburn B.2 trainer (flown by "Doc" Watson); the first two of these precious old-timers were merely taxied (the Blériot, in the hands of S/L. Sowrey, perhaps attained six inches of altitude), but the less venerable B.2 was duly flown.

An R.A.F. Sabre got across from Linton-on-Ouse for an aerobatic demonstration, and "Gerry" Smith provided a contrasting type of display in a Slingsby Sky sailplane. Four Meteors of the Royal Netherlands Air Force—in more propitious circumstances there would have been a whole squadron—demonstrated formation aerobatics; the Fokker S.14 jet trainer, however, was unable to make what would have been its first appearance in this country. Some Belgian Air Force F-84s were likewise absentees (as were the U.S.A.F. F-86s), but Capt. Aviateur Yves Bodart, in a Belgian Meteor 8, put on an aerobatic show to which that much-overworked description "nought feet" could, for once, have been applied with a considerable measure of truth.

The Fleet Air Arm got a quartet of Seahawks through from Lossiemouth for formation aerobatics, but a RATO demonstration by Sea Furies was a Naval item that had to be cancelled. A Dragonfly, however, tried conclusions with a "submarine," the survivors from which were ultimately winched-up from a rubber dinghy into the helicopter.

Light relief was supplied by a Yeadon club Tiger with an "invisible" pilot, and the parachute descent—without seeing which no air-display crowd would go home happy—was contributed by Johnny Ralling, who selected his alighting-spot as accurately as he had done at Swansea two days earlier.

R.A.F. Vampires and Canberras also contributed formation items, so, all in all, the public had its money's worth—especially as another item which went according to programme was an aerobatic show, of characteristic brilliance, by Prince Cantacuzene in his faithful little Bücker Jungmeister biplane.

TWIN-TURBINE HELICOPTER

Kaman HTK-1/Boeing 502-2 Conversion

In this view one of the fat exhaust chimneys is visible, as are a pair of external fuel tanks which have been added at the foot of the rotor pylons.

ALTHOUGH they are but junior partners in the huge American helicopter industry, the Kaman Aircraft Corporation (the name is pronounced like the American rendering of "command" less the "d"), of Bloomfield, Connecticut, can claim to have been responsible for several notable "firsts" in this field. Right from the outset they have concentrated upon the shaft-drive type of helicopter with two intermeshing rotors side-by-side. Control is effected by servo-operated "ailerons" on the blades, and stability is assisted by fixed fins and a variable-incidence tailplane.

The first fully servo-controlled helicopter to fly anywhere in the world is claimed by Kaman, the date being 1947. Two years later a C.A.A. certificate was gained, and the first developed version was in production for the U.S. Navy the following year, 1950. This aircraft, styled HTK, is a 2,500 lb training and utility machine used in fair numbers by the Navy and Marine Corps. It has since been joined in production by the larger HOK-1 liaison type, of generally similar layout.

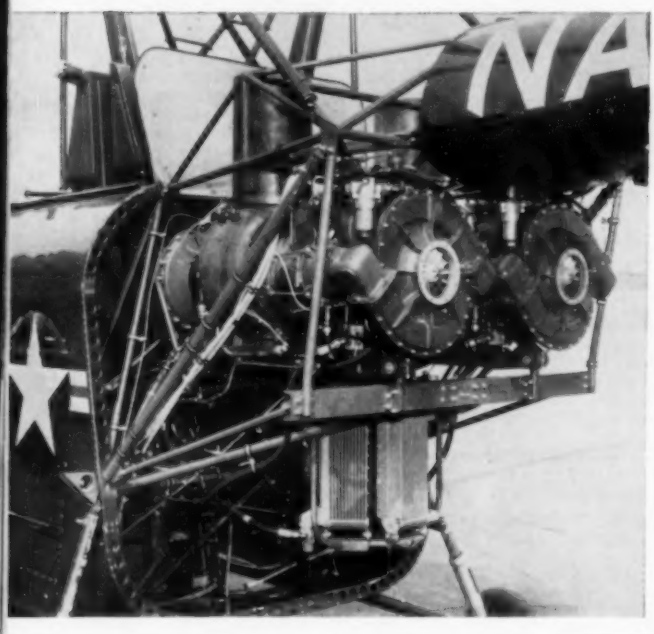
Back in 1951, Kaman adapted a K-225 development helicopter (a machine with a rotor system similar to that of the HTK series) to take a Boeing Model 502 shaft-drive gas turbine in place of the Lycoming flat-six piston engine originally fitted. This experimental turbine-powered helicopter (the first in the world) was illustrated and commented upon on p. 320 of our issue of March 12th of this year.

Kaman have now effected a similar conversion of a production HTK-1, although the new turbine-driven machine is more ambitious and has two Boeing 502-2 turboprops, which are shown in some detail in the photograph on the left.

The engines themselves are not new in conception, but they have a great deal of development behind them and are highly reliable; no other engine in their class is available. The power output is at present rated at 190 s.h.p. on a continuous basis, and flexibility in operation is enhanced by the fact that the engine is of the free-turbine layout. The Lycoming piston-engine originally fitted gave 240 h.p. yet weighed at least as much as the pair of side-by-side gas turbines giving 380 h.p.; fuel consumption, however, is very much in the piston engine's favour.

The two turbines are both geared into a common box, from which a single drive is taken up to the rotors. Both engines are employed for take-off and full-load hovering, while forward flight is possible with one engine shut down, Gannet fashion.

The new aircraft is a joint Army/Navy project. The first flight took place at Bloomfield on March 26th, although the photographs on this page have only now been released by the Department of Defense.



This close-up shows the pair of Boeing gas turbines, together with their supporting structure. The rearward-facing intakes are completely unprotected; low airspeeds necessitate a large oil cooler, seen below.

NEXT MONTH'S BIG EXERCISE

THIS year's major United Kingdom air defence exercise, to be held next month, has been given the code-name "Dividend." It will be in two phases—from 2000 hr on Friday, July 16th to 1800 hr on Sunday, the 18th, and from 1500 hr on Thursday, the 22nd, to 1800 hr on Sunday, the 25th.

The object of "Dividend" is to exercise the overall air defence system of the United Kingdom—under the command of Air Marshal Sir Dermot Boyle, A.O.C-in-C. Fighter Command—against all forms of air attack.

SUPPORT FOR THE BEVERLEY

ARGUMENTS for the use of the Blackburn Beverley for the transport of North Australian cattle were recently put forward in an article appearing in *Queensland Country Life*. "It would be unfortunate for the welfare of Australia in peace and war," the article begins, "if Sir Arthur Fadden's reported interest in Blackburn Beverley air freighters as a means of flying cattle from North Australia to railhead is thwarted because of the clamour for a more costly but less efficient railway extension from Dajarra."

It should be mentioned that the aircraft *versus* railway controversy in this case is inevitably influenced by political, as well as national, motives. Many points made in the article, however, are undoubtedly valid. "Reports indicate," the paper continues, "that the Beverley is mechanically capable of transporting 100 yearling cattle 200 miles in an hour from a 300-yard runway." Other advantages of the aircraft are stated to be its greater suitability for seasonal work, its ability to yield a large return on outlay in a very short time, and its greater value and decreased vulnerability as a potential wartime supply line on the continent's northern front.

"ARK ROYAL" SEA TRIALS

THE aircraft carrier *Ark Royal*, now being completed for the Royal Navy by Cammell Laird and Co., at Birkenhead, was expected to begin her contractors' sea trials last Friday. These trials will last several weeks.

Sister ship to H.M.S. *Eagle*, and of 36,800 tons displacement, the vessel is one of the largest ever built for the Royal Navy. She is fitted with the latest equipment for operating high-speed and comparatively heavy aircraft, including the angled deck, side aircraft-lift and steam catapult. She will be the first British carrier to be fitted with the steam catapult—a British invention—and a side lift.

For her contractors' trials the new carrier has a small advance Naval party of about 140 officers and men. When fully manned she will have a complement of more than 2,000. She is expected to come into operational service next year.

HERE AND THERE

R-R., A. and M.: Sixty Rolls-Royce cars attended the spring rally of the 20 Ghost Club, which was held on the apron in front of the B.E.A. engineering base at London Airport. Here, Mr. Stanley Sears gives a ride to Capt. E. Waits and Stewardess Carol Herdman; in the background some more recent Rolls-Royce products—a Viscount's Darts—are visible.

A.O.P. Award

THE Royal Commission on Awards to Inventors last week recommended an award of £1,000 to Lt-Col. H. C. Bazeley, who had claimed that he originally developed the method of using Auster aircraft, piloted by artillery officers, for gunnery observation.

Royal Interest

THIS year's *Model Engineer* Exhibition (New Horticultural Hall, London, S.W.1, August 18th-28th) will be honoured by a visit from Prince Bernhard of the Netherlands; he is to fly to England specially to perform the opening ceremony.

In the Window

A SECTIONED Armstrong Siddeley Adder, in motion, is a front-window attraction at the new Birmingham Exchange Engineering Centre.

Worthwhile Accidents?

ONTARIO'S Minister of Health, Dr. Mackinnon Phillips, took part in a Toronto demonstration of the use of helicopters for conveying road-accident victims to hospitals.

Now it can be Told

THE Royal Air Force Benevolent Fund has received the sum of £12,015 as the result of the realization of an insurance policy assigned to the Fund by the late Lord Kenilworth (formerly Sir John Siddeley), who died last November. He presented the policy in 1939, with the proviso that his gift should receive no publicity during his lifetime.

The National Air Races

IMPORTANT events in the near future include the Royal Aeronautical Society's Garden Party at London Airport next Sunday, June 13th (admission confined to R.Ae.S. members and guests) and the National Air Races at Baginton, Coventry, on the following Friday evening and Saturday. We listed the race entries in our issue of May 14th, and will repeat them next week. Flying displays—details of which we gave on May 28th—will take place on both days, at 7 p.m. and 3 p.m. respectively. Tickets for the reserved enclosure (Friday, 2s for adults and 1s for under-15s; Saturday, 4s and 2s) are obtainable from the Town Clerk, Council House, Coventry, or Godfrey's Travel Agency, Pool Meadow. There is no advance booking for the general public enclosure, where prices are 1s (adults) and 6d (children) on Friday and 2s and 1s on Saturday.

WORLD AIR POWER

MILITARY aircraft of the world, sub-divided into nearly 20 different operational categories, will be reviewed and illustrated in the special number of *Flight* appearing on June 25th—a fortnight from now. There is certain to be a heavy demand for this greatly enlarged issue, and we suggest that readers should place orders with their newsagents.

Future of Tarrant Rushton

A STATEMENT of policy on Tarrant Rushton Airfield was made by Mr. George Ward, Under-Secretary for Air, in a written Parliamentary reply last week. He said that while the R.A.F. were not at the moment using the airfield, it had an important place in defence plans, and it must be kept in a state of readiness. The Air Ministry could not continue to hold it on requisition indefinitely, and intended to purchase it. The most economical course thereafter would be to allow Flight Refuelling, Ltd.—tenants since 1947—to continue their work there on the understanding that the airfield could be reoccupied at once if necessary.

Specialized Science

RUBBER technologists from 12 countries will attend the third Rubber Technology Conference in London from June 22nd to 25th, when 50 separate papers will be discussed. The organizers are the Institution of the Rubber Industry, 12, Whitehall, London, S.W.1 (Whitehall 5012).

Electrolytic Titanium

SUCCESSFUL experiments in the production of titanium by the electrolytic process are reported from Canada, where the Shawinigan Water and Power Co. has been treating titanium slag from the smelting plant of the Quebec Iron and Titanium Corporation. A photograph of the Canadian titanium-forging plant recently acquired by the Hawker Siddeley Group appears on page 771 of this issue.

Motor Cycle T.T. News

NEXT Thursday, June 17th, *The Motor Cycle* will be publishing its annual Tourist Trophy Number, and on the following Thursday its T.T. Report Number. Between them, these two issues will provide detailed, fully illustrated accounts of the seven important contests over the Isle of Man circuit. It is expected that *Flight's* new Gipsy Major Gemini will be ready in time to assist in rushing back news and pictures of both the Le Mans 24-hour car race and some of the I.o.M. events.

VISITING GLOSTERS: Mr. George Ward, the Parliamentary Under-Secretary of State for Air, recently visited the Moreton Valence and Brockworth establishments of the Gloster Aircraft Company. Here, standing next to a Javelin which was demonstrated by W/C. Martin, are (from left): Mr. E. S. Greenwood, Mr. George Ward, Mr. P. G. Crabbe, W/C. R. F. Martin, Mr. R. Walker, Dr. R. Bennett, M.P., Mr. F. Sanders, Mr. R. Ward, Mr. McF. Davis and Mr. J. Lobley.

The 35th Anniversary of the First Direct Crossing of the Atlantic by Air

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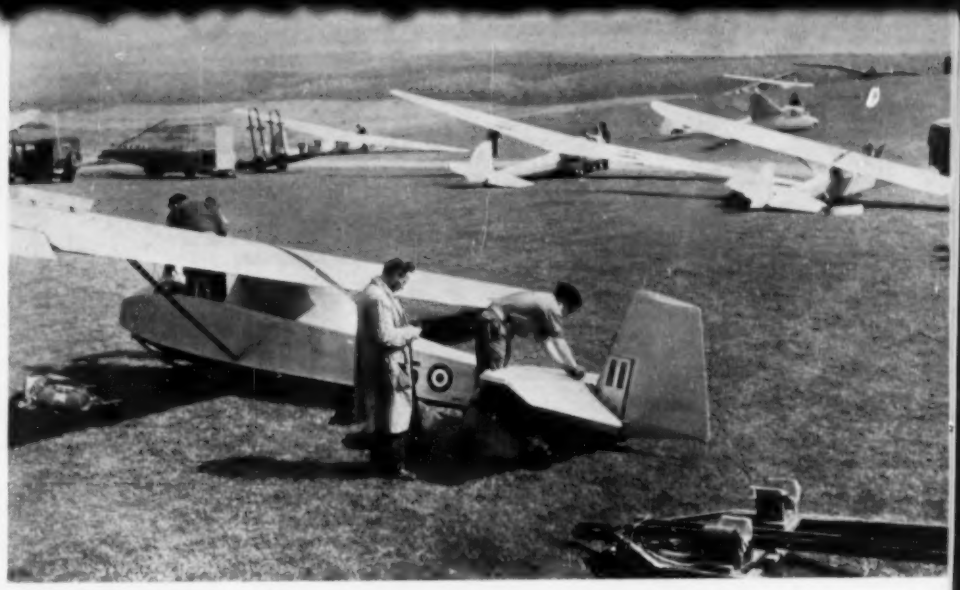
The 2nd T.A.F. Gliding Competitions : Swan-song of a Fine Ridge-site

By KENNETH OWEN

"Flight" Photographs



SCHARFOLDENDORF 1954

GLIDING and soaring by members of the Royal Air Force in Germany, according to many pundits in Britain, is very comfortable and much too easy. In addition to many superb sites, there are alleged to be an unlimited number of gliders in excellent condition, and an inexhaustible supply of money and labour to service them.

Whatever the degree of truth these opinions may have had in the past, the facts today are that the Service gliding clubs are self supporting, maintenance of their limited number of machines is no easy matter, their winches and vehicles are in just as bad a state as those of most British clubs, and money is just as tight; moreover—unless someone in authority shows an intelligent sense of relative values—the clubs will very shortly lose the use of their only hill site, the famed soaring ridge at Scharfoldendorf, which is the equal of any in Europe.

It was at Scharfoldendorf a fortnight ago, on the occasion of the annual gliding contests organized by the Association of 2nd T.A.F. Gliding Clubs, that I was able to learn something of the present background to R.A.F. gliding in Germany. The Association comprises nine clubs, including the B.A.O.R. Gliding Club at Hameln (the only non-R.A.F. unit); their locations are shown on the sketch-map on page 759. Scharfoldendorf is used as an advanced soaring site by the Bad Eilsen Headquarters Club (whose elementary training takes place at Bückeburg Airfield) and also by members of the other 2nd T.A.F. clubs and by groups of Cranwell cadets. It is also the home of the 2nd T.A.F. Rest Centre.

The news that the Scharfoldendorf soaring site was likely to close down accelerated a visit which I had been contemplating for some time. Accordingly, I journeyed to Germany.

From Hanover's Langenhagen Airport I was rapidly transported by Volkswagen towards Scharfoldendorf (although an unusually large number of signs pointed to Umleitung). On arrival I was greeted by A. Cdre. G. B. M. Rhind and F/L. V. Willis—respectively chairman and secretary of the Command Gliding Association—who lost no time in showing me the actual site, where familiarization and practice flying was taking place in preparation for the start of the contests the following day.

To one accustomed to thinking of the undulating Dunstable site as pretty tricky to land on, a first impression of "Scharf" was distinctly frightening. The launches seemed exceptionally short but, being made across the ridge and straight into the steady west-wind hill-lift, certainly gave an adequate height. Standing on the crest of the fairly steep lee slope and enquiring where the landing area was, I was told that this was it. My disbelief turned into alarm as a Kranich hurtled steeply and swiftly down towards us in demonstration. Plenty of speed and a pinpoint judgment were obviously required in making a landing approach through the lee-side down-currents and up the slope.

Just to make things more difficult, the ridge is three-dimensional, possessing a most unhealthy amount of double curvature.

Members of the Brüggen team, who scored high marks from the start: (Left) F/O. David Brett, F/O. J. P. Fabesch, and F/O. J. S. R. Salmond. (Right) Just back from Holland: team captain F/O. J. E. A. Jenkins, with retrieving crew.

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This was subsequently proved in the following week's competition flying: with the wind *along* the ridge, one still had to land uphill. A relative novice like myself simply could not win; this was obviously big-time gliding.

At 9 o'clock the next morning (Saturday, May 22nd) the team captains forming the flying committee conferred, and decided that the day's task should be free distance, with a minimum of 25 km. In bright morning sunshine and a light southerly breeze the ground crews and pilots finished rigging their machines; the sleek, efficient Weihes and Meises, the elegant gull-winged Minimoas, and the angular, purposeful Grunaus. The competition scoring and awards were to be based on three separate groups of sailplanes: Class A, unlimited (in each case a Weihe); Class B, all types other than Weihe and Rhon-sperber (Meises and Minimoas); and Class C, Grunau Baby only. Pilots in Class C were required to have less than 50 hours' gliding experience, and not to be qualified power pilots.

The team entries were as follows: *H.Q. Unit*—Weihe, Meise, Grunau; *Gütersloh*—Weihe, Minimoa, Grunau; *Wahn*—Mu 17 (damaged on practice day and withdrawn), Grunau; *Geilenkirchen*—Meise; *Oldenburg*—Meise; *Sylt*—Grunau; *Hameln*—Olympia, Grunau. Also invited to compete was the Belgian *Club Militaire de Vol à Voile*, Butzweilerhof, who entered the only post-war machine in the competition, a German-built Baby III, wheeled and smartly varnished. Among the individual entries was F/L. Tony Smith, commanding officer of the Rest Centre and C.F.I. at Scharfoldendorf, in a Minimoa S-42, positively the most photogenic machine present.

The ascent of F.6—in this case the Fassberg club's white Weihe—on the medium-length launch along the ridge signalled the start of the 1954 competitions. Under the efficient exhortations of the launchmaster, Maj. C. Newbold (of the Signals staff, Bad Eilsen), this was followed in rapid succession by the Gütersloh Minimoa, the Gütersloh cream-and-green Weihe, and other machines down the list. The launching positions had been allocated to clubs by means of a draw; a club with two or three entries could itself decide the order of launching for its individual aircraft. Each club's aircraft entry had two pilots, who were to fly on alternate days.

A. Cdre. G. B. M. Rhind with Mr. Ian Gray, of the Headquarters Club, after the latter's flight to Jever.

Unfortunately the day's weather was not conducive to thermals, and as the wind was along the ridge few aircraft were able to gain sufficient height to begin cross-country flights. Although in these circumstances the conditions at the time of launch, in effect mere chance, had a predominant effect on an aircraft's performance—an opinion confirmed by the fact that the only two machines to get away were launched within one minute of each other—nevertheless, it is significant that the pilots of these two machines went on to put up consistently high performances throughout the contests. They were Cpl. Prowse (in Gütersloh's Grunau) who landed at Voldagsen, having failed by 8 km to make the qualifying distance; and F/O. Philip Fabesch of Brüggen, in a Meise, whose 34-km flight north to Pattensen earned his club a useful first-day 1,000-point lead. Among the gallant attempts to get away was that of Capt. Ruhling in the Belgian Grunau, which was seen circling miles downwind at about ridge height before hopefully beginning a long, straight glide back. Miraculously the valley trees were cleared and a landing made at the foot of the East slope: the gallant captain later summed it up: "I came long way upwind, I was myself astonished."

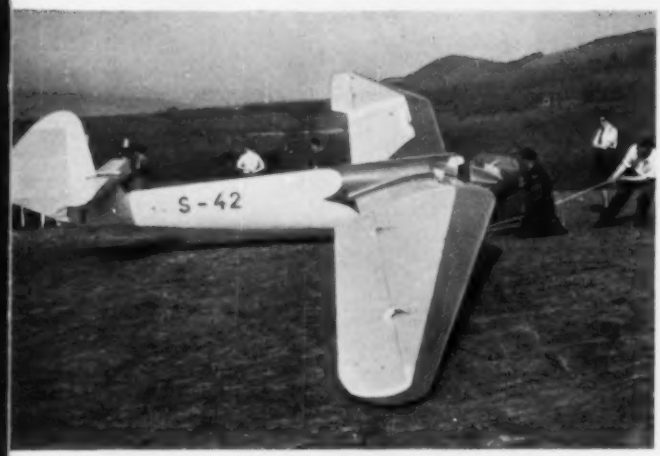
An equally concise appraisal of the rather quiet atmosphere in the mess that night was given later by Capt. Ruhling; "*Ce n'est pas beaucoup d'animation pour un weekend?*"

Slightly more *animation* was apparent the next day, when free distance was again the task. A hot sun provided rather more thermal activity than on the previous day, and most people managed to get away—though not particularly far. Several flights of between 30 and 45 km were made, mainly to the north-east and north-west; F/O. Jenkins in the Brüggen Weihe and Sgt. Minter in the Hameln Olympia decided to fly east—but not sufficiently far east to cause international complications; while the day's best flight was made by Ian Gray of the Control Commission, flying Scharfoldendorf's Weihe 71 km west to Bielefeld.

Sunday had provided most of the clubs with at least one retrieve, and incidents such as the flat tyre on Ian Gray's retrieving vehicle at the bottom of the hill, at midnight and in pouring rain, at least provided experience for the snags of the longer and more rigorous journeys to come.

Low cloud and steady rain on Monday resulted in the decision "No competition flying" and subsequent practice circuits and ground maintenance jobs. An interview with A. Cdre. Rhind seemed a legitimate pursuit, also, and from this some further details of the Association came to light. At present the organization's nine clubs have a total of some 230 flying members, and about 90 sailplanes and gliders. Unlike A.T.C. gliding, the Association receives no money from public sources. It receives an annual grant from the Command Sports Board Fund, whose income is derived from such sources as N.A.A.F.I. profits: this grant has been cut from £1,500 last year to £500 this year, of which approximately £150 goes towards insurance against damage to property. The remaining £350 is distributed to the

Taken by the writer from the Kranich, this photograph shows a section of the tree-covered ridge just north of the site. Capt. Ruhling's Grunau is circling below in the same thermal.



Most photogenic aircraft in the contests: Scharfoldendorf's Minimoa, with R. Jefferey (individual class) at the controls.

nine clubs on the basis of their number of members and aircraft.

One particular anomaly is that, although the sailplanes and gliders flown by the clubs are considered to be R.A.F. aircraft (being all ex-enemy machines "acquired by capture" after the end of the war and allocated to the clubs) all materials used for their repair and maintenance have to be purchased from German sources by the clubs. Maintenance work has to be done either by club members themselves or by German civilian craftsmen paid by the clubs at standard rates, and vehicles and winches have to be purchased, serviced and repaired by the clubs.

One useful source of revenue to the Association in the past has been the number of advanced courses held at Scharfoldendorf for Home Command gliding instructors and for Cranwell cadets during their vacations. It is now almost certain that the whole of the Rest Centre and Gliding Training School at Scharfoldendorf will have to close down in the near future, as the entire accommodation and part of the site are to be used for an R.A.F. ground technical unit.

My comments on the above facts are given at the end of this article. To complete the background picture of Scharfoldendorf, however, some interesting historical details were provided by F/L. Smith, C.O. of Scharfoldendorf and gliding C.F.I. The site was originally that of a German civilian gliding club, shortly after World War I, and the only permanent building was the small private hotel which is now the officers' mess. With the introduction of the Hitler regime came the virtual militarization of Scharfoldendorf; a unit of the national flying corps was established there; hangars, workshops and the blunt, impressive main block were constructed. For primary training, gliders were bungee-launched over the west side of the ridge and, after landing at the bottom, were towed up the slope on a rack-type railway. Only the advanced machines used the top landing-site. The value of gliding in the early training of Luftwaffe pilots has been generally realized: in this scheme, Scharfoldendorf played an important part.

Immediately after the war, the U.S. Army arrived at Scharfoldendorf, and for various alleged reasons and in various ways (there is no shortage of conflicting reports on this) destroyed a large number of the gliders there. Later, a number of the hangars, classed as "war potential," were also demolished. With the subsequent establishment of the 2nd R.A.F. Rest Centre for convalescents at Scharf, advantage was taken of the gliding facilities. Other R.A.F. clubs sprang up at various airfields where German gliders were discovered, the Association was formed, and in 1947 the Headquarters Unit Club moved to Scharfoldendorf.

And now, with the forthcoming movement of the 2nd A.T.A.F. headquarters from Bad Eilsen to München Gladbach, and the probable closure of the site for any gliding at all, the Headquarters Unit Club is shortly to move out of Scharfoldendorf. But let us return now to the main subject of this article, this year's championships.

Tuesday was a most interesting day, pilot's-choice goal flights being the task laid down. The choice between optimism and experience in choosing a goal is always tricky, and the general opinion on the weather this day was "Good—but not all that good." Decided caution was consequently apparent in the not-too-distant downwind goals selected; nevertheless there was one unusual goal—Wolfhagen, 78 km to the south and directly upwind, declared by Fabesch with the Brüggen Meise.

On this occasion the Brüggen club's retrieving party agreed to be encumbered with a neutral observer, and I thus found myself being transported at high velocity towards Göttingen (where the aerofoil sections come from), with an open trailer attached to the rear—of the vehicle, of course. A phone call from Göttingen to Scharf confirmed that our pilot had arrived at his goal, and we

Scharfoldendorf personalities. (Right) F/L. R. A. H. Smith, F/L. V. Willis and S/L. S. A. Fentum, of the organizing committee. (Below) F/O. B. B. Sharman, Fassberg; F/O. D. G. Edwards and Cpl. J. Prowse, Gütersloh.

(Right) F/O. D. H. Ellis, an individual contestant in the Minimoa. (Above) The writer samples the prone-position comfort of the Horten IV, rescued from a loft prior to its removal to Oldenburg.

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continued south towards Kassel with satisfaction and two Australian hitchhikers.

Alarm at the thought of being investigated on entering the American Zone proved unfounded, and the only snag *en route* was caused by the neutral observer's navigational incompetence through the outskirts of Kassel, plus some more Umleitung trouble. As the sun began to go down, however, we finally arrived at H. Hartmann's *Esso-Wagenpflege* establishment, Wolfhagen, outside which stood four petrol pumps, a German policeman and a de-rigged Meise.

Over an excellent veal schnitzel and an equally excellent lager at the village *Ratskeller*, we congratulated F/O. Fabesch and asked for details of his flight. The upwind direction had been chosen, he told us, because of the hills *en route;* convenient cloud streets had formed directly along his line of flight, and he had arrived over Wolfhagen with 4,000ft to spare. To the neutral observer, it sounded much too simple.

The journey back to Scharfoldendorf, in darkness, was uneventful. At least, we didn't actually hit anything, although a man carrying a tuba loomed rather close. The rear light fell off while I was driving, but I was assured it hadn't been working anyway. In Scharfoldendorf village, of all places, we took the wrong turning, but eventually topped the ridge at about 1.30 a.m. with one intact Meise, plus pilot.

We learned that other people had travelled that day, too. F/O. B. B. Sharman in F.6 and Cpl. W. Cowburn in Scharf's Weihe had both completed 110-km flights to their goals at Fassberg and Verden (just south of Bremen), and Capt. Ruhling had accomplished his goal flight to Lauenau Brauerei—"where is," he explained, "the best beer in Saxony." True, Lauenau was only 40 km away, and Cpl. Prowse had flown farther, but one felt somehow that Capt. Ruhling and his retrieving crew didn't really mind.

The haze that lay over the valleys on each side of the ridge on the following day, Wednesday, indicated the "soggy" conditions which allowed only five aircraft to contact lift and get away from the site. The day's outstanding flight—and the longest distance covered so far—was made by Ian Gray, who put his Weihe down right outside Flying Wing headquarters at R.A.F. Station Jever, on the other side of Bremen and 212 km from Scharfoldendorf. Purposefully, yet unobtrusively, Sgt. Len Simpson in Geilenkirchen's Meise flew 40 km to Lauenau.

Because of the forthcoming closure of the site, plans had been made during the week for the disposal of a number of stored glider-parts at Scharf to other clubs, and it was on Wednesday that the most interesting of these were brought out into the open. They comprised the wings and fuselage of one of the few Horten IV prone-position tailless sailplanes which were built by the Horten brothers during the war. (One other was repaired in Britain by the R.A.E., flown at Farnborough and Cranfield and subsequently transferred to the U.S.A.). A German aircraft woodworker at Scharfoldendorf spoke of an 11-hour flight made by Dr. Reimar Horten in this particular machine from Göttingen in 1942. Apart from a broken transparent canopy, the fuselage appears in excellent basic condition. The port wing is damaged near the root, behind the main spar, while the starboard wing is intact, but it is believed that the wooden tips now fitted to both wings are non-standard and ought to be replaced. The enthusiasts of the Oldenburg club who are attempting to rebuild this most interesting sailplane deserve success: any information concerning the original metal tips will gladly be forwarded to them by this writer.

Meteorologically, Thursday promised to be interesting: the forecast, received by telephone and typed by the German telephonist, began "Empty cyclone centred over Skandinavia." What actually happened was that the east side of the ridge became soarable—but 5 km away from the site. It was possible to glide across this gap from a good launch, but impossible to get back again; the day's task was therefore changed from height and duration (landing back on site) to free distance.

Gray's Weihe, damaged during the retrieve from Jever, was not available for Thursday's flying. The decision was therefore made to fly the Scharfoldendorf Grunau in Class A (against Weihes, but with a Weihe pilot) instead of in Class C—a decision which certainly justified itself. Flown by Cpl. Cowburn, Grunau S.9 covered 61 km to Minden; admittedly no great distance, but on a poor distance day sufficient to beat the Weihes and to collect 1,000 points. Another thousand were quietly collected by Cpl. Prowse of Gütersloh in Class C (Eisbergen, 53 km), while Class B's top points went to F/O. Derek Ellis, an individual contestant in the Scharf Minimoa, for a 47-km flight which ended on the football pitch of Rinteln Hospital.

The day's difficult conditions were reflected in the number of aircraft which had "fallen off the ridge" into the valleys near the site—three on the east side, and three on the west. A modicum of glidermanship was exercised by F/O. David Brett in BG 25, after landing at Deckbergen: a wave-in to Jock Young in G.18 above persuaded the rival Weihe pilot to land alongside, instead of using his height to gain an extra few kilometres.

At the end of Thursday's flying, the positions of the three leading clubs were interestingly close: the Headquarters club led with 5,507 points; Gütersloh had 5,412; and Brüggen 5,305. Fassberg was next with 2,234. On individual averages, Ian Gray had 1,000, Phil Fabesch 889, and Cpl. Prowse 800.

Friday, by contrast with the previous day, was sparkling. With an east wind, ideal tufts of cumulus, cloud streets building up in the distance, and much lift in the bright blue sky between clouds, most aircraft got away on their first launch. This was clearly the best day of the contests to date for long-distance flight, and hopes were high for "Gold C" distances (300 km).

At lunchtime, the launching point was deserted except for two aircraft: the wind was strong and the sun was hot. Soon, from Gütersloh and Bielefeld respectively, Salmond in the Brüggen Meise and Gray in Scharfoldendorf's Weihe reported back by phone to F/O. David Pitts in the control room. Two coloured pins went into the map, both about 93 km from home. But there was to be bigger stuff that day. First came news of Sgt. Minter, flying the Hameln Club's Meise: he had reached Dortmund, 150 km away. A little later the first international flight was logged, as a bored voice belonging to Brüggen team-captain J. E. A. Jenkins reported "I'm by the Zuyder Zee. Tell the boys not to worry, I'm quite comfortable." But the boys, with characteristic Brüggen efficiency, were already on the way, and shortly afterwards phoned back from Bückeburg to find out their pilot's position. It was near Meppel, on the east side of the Zuyder Zee, and 237 km from Scharfoldendorf.

Two corporals were next to phone, reporting flights of 141 and 122 km respectively. They were Cpl. Durr of Fassberg (Meise)

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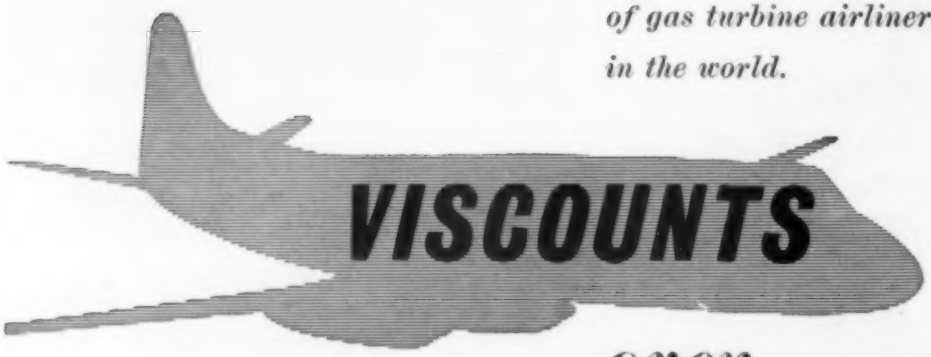

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who landed 40 km north of Dortmund, and—as might have been expected—Cpl. Prowse, top of the Grunau class once more with a flight to Ahlen, between Gütersloh and Hamm.

This was not all. A third corporal, John Curry in the Gütersloh Weihe, reported that he, too, was in Holland. What was more important, he was at Zwolle, farther into Holland—14 km farther—than was Jenkins. Two thousand points to Gütersloh. Last two pilots to report in were Sgt. Simpson of Geilenkirchen (110 km in the Meise to Pove, near Osnabruck) and Sgt. Hutt of Wahn, third in Class A after having flown his Weihe 172 km to Recklinghausen. This had indeed been a great day for the n.c.o.s!

Friday, with its long retrieves, emphasized the importance of having reasonably efficient vehicles. It did so by the fact that not all the vehicles *were* reasonably efficient. Where two or more aircraft were dependent on one retrieving-crew/vehicle/trailer combination the problem was particularly acute. Thus the Gütersloh retrieving crew for the Weihe in Holland was unable to leave until Friday evening, and consequently the machine lost the following day's flying.

The meteorologist-cum-telephone-operator was again in excellent form on Saturday: an "insirence thundery trouch" over Holland and Rhineland was moving slowly east—which, of course, made all the difference to the day's flight-planning. Fixed goals of Handorf (Munster), 133 km away (Class A); and Gütersloh Airfield, 92 km away (Class B); were laid down, with a free-distance task for the Grunaus in order to increase the chance of "Silver C" distance flights.

After early-morning haze, the day bubbled up to provide good thermals and most people got away fairly quickly during the morning. At about 11 o'clock the Brüggen Weihe returned from its trip to the Zuyder Zee—a very smart piece of retrieving—and was rapidly rigged for F/O. Brett to fly.

During the afternoon, with the co-operation of Cpl. Bill Greenall of the H.Q. club, I was able to sample the air above Scharfoldendorf in the club's Kranich, the big bird-like machine which had remained on the ground for most of the week. After a good launch, Cpl. Greenall worked hard on the thermals, taking us up to 3,500ft (above the site, which is itself 1,140ft a.s.l.). The dark wooded slopes of the long (20 km) north-westerly ridge, curving round in a bowl at its northerly end, stood out clearly from the valleys on either side. Across the valley to the west wound the River Weser, pointing towards Hameln, while below us circled Capt. Ruhling in his Grunau, having been delayed in launching by repairs to the machine.

First impressions of flying the Kranich, from the front seat, were of the beautifully light response to the controls. It is only when one looks along the wing leading-edge that the size of the machine becomes apparent. We were down to 1,000ft before I experienced delayed sink, and then lift. As I circled hard in my thermal, a buzzard soared alongside. When next I looked, he was way above me. One wishes birds wouldn't do that sort of thing; it seems quite tactless. After maintaining height for a while, and even rising a small amount (and also noticing a grey blanket of haze and rain coming in from the south-east), I took her down and Cpl. Greenall made the landing approach, using the spoilers with startling effect. As I had imagined, it *was* a new sensation to look upwards at the landing point on the final approach.

On the next flight, I tried the rear position (with open cockpit) and personally found it preferable for most aspects of flying. The most remarkable point about this flight, however, was the steady 3-4 metres/sec lift we were getting in front of the blanket of rain-cloud, which took us straight from the top of the launch to 5,000ft with no trouble at all. To emphasize his assertion that the Kranich was a high-performance machine (with which I was already in wholehearted agreement), Cpl. Greenall next subjected me to a series of tight vertical turns and a general exhibition of the sailplane's abilities. I was impressed.

The day's serious flying had taken Ruhling's Grunau, from the thermal we had shared over Scharfoldendorf, westward to Carrel, 155 km away, to win a deserved 1,000 points for the Belgian club. Fabesch and his precision-flying Meise achieved 80 of the 92 km to his goal (landing dead on track), and Cowburn and Brett shared top honours for H.Q. and Brüggen in Class A. For Sylt, F/O. Geoff Arkell had taken the Scharf-borrowed Grunau S.6 on its first real cross-country during the contests, a distance of 48 km to the German gliding club site at Mollenburg. This was just as well, for bad weather restricted flying on Sunday, Monday and Tuesday, the last three days of the meeting. The final results, received with acclaim by the Brüggen "Barons" (who can now try thermalling their Sabres), were as follows:—

Team Placings.—1, Brüggen, 9,238 points (the Club received the Winners' Challenge Shield from Mrs. Cheshire, wife of A.V-M. W. G. Cheshire, Air Officer Admin. at H.Q. 2nd A.T.A.F.); 2, H.Q. Unit, 8069; 3, Gütersloh, 7,255; 4, Fassberg, 4,255; B.A.O.R., Hameln, 3,724; Belgian Military Club, 2,581; Geilenkirchen, 2,137; Wahn, 1,271; Oldenburg, 1,053; Sylt, 364.

Location of the gliding clubs taking part in this year's competitions. Outstanding distance flights were made to Jever and Zwolle.

Class "A" Prizes.—1, Cpl. M. Cowburn, H.Q. Unit, 748 points; 2, Mr. I. Gray, H.Q. Unit, 598.

Class "B" Prizes.—1, F/O. J. P. Fabesch, Brüggen, 718; 2, Segt. R. A. Minter, B.A.O.R., Hameln, 667.

Class "C" Prizes.—1, Capt. A. E. Ruhling, Belgian Military Club, 516; 2, F/O. N. J. S. Jurdon, H.Q. Unit, 500.

Individual Prize for the most outstanding single performance.—Capt. A. E. Ruhling, of the Belgian Military Club, for his Class "C" free distance flight of 155 km in a Grunau Baby on May 29th. (Record for an aircraft of this type launched from Scharfoldendorf.)

Special Prize for the most consistently good performance during the competition.—Cpl. H. J. Prowse, Gütersloh Club. (In the final calculations, his performance in the Grunau was measured against that of the Meises and Minimoas in Class "B," as his flying experience was actually more than the Class "C" maximum. Even on this basis, his scores were consistently good.)

General Reflections.—From what has been written above concerning the structure of R.A.F. gliding in Germany, it is obvious that gliding receives little official encouragement. It is treated in exactly the same manner as football or cricket, in spite of the fact that the R.A.F. is an Air Service and that the only real way to get to know the air is by flying in it—without an engine.

A most healthy sign is the increasing number of young Service pilots, Cranwell-trained, who have an awareness of the value of gliding. Their enthusiasm at the championships was most encouraging, and itself deserves to be encouraged. Individual station commanders can and do help, but whole-hearted backing should come from a higher source. If the opinion really is that gliding has no more value than ball-games, then the writer would suggest that somewhere, somehow, somebody is out of touch.

The annual amount of gliding performed in 2nd T.A.F. is steadily decreasing, due mainly to difficulty in repairing aircraft, vehicles and winches, and to the sheer impossibility of obtaining new equipment. The present lack of official support is causing this insidious decline by allowing the gliding movement to waste away. This trend can be retarded only slightly by the enthusiasm of the gliding clubs.

What cannot be retarded at all, however, and is therefore the more dangerous, is the serious blow about to be dealt to those who value the advanced soaring facilities at Scharfoldendorf. The shortsightedness which led to a bulldozer commencing to dig up earth across the short-launch site while the competitions were in progress is quite appalling. The new unit, it appears, could equally well be located a short distance away.

The future of gliding in the 2nd T.A.F. clubs—and much the same applies to the R.A.F. Gliding and Soaring Association in this country—depends basically on a high-level appreciation of its value, and of the serious difficulties now encountered. We can only hope that soon a new and more enlightened approach may be made to the problem.

AIRCRAFT INTELLIGENCE

Great Britain

de Havilland Comet 3. According to *American Aviation*, the Comet series 3 is powered by "the Avon RA.26 (11,000 lb thrust) with noticeably larger air intakes." No details have been released of any engine bearing such a designation. The American report also comments on the fact that the Comet 3 flaps "are designed to lower in sections."

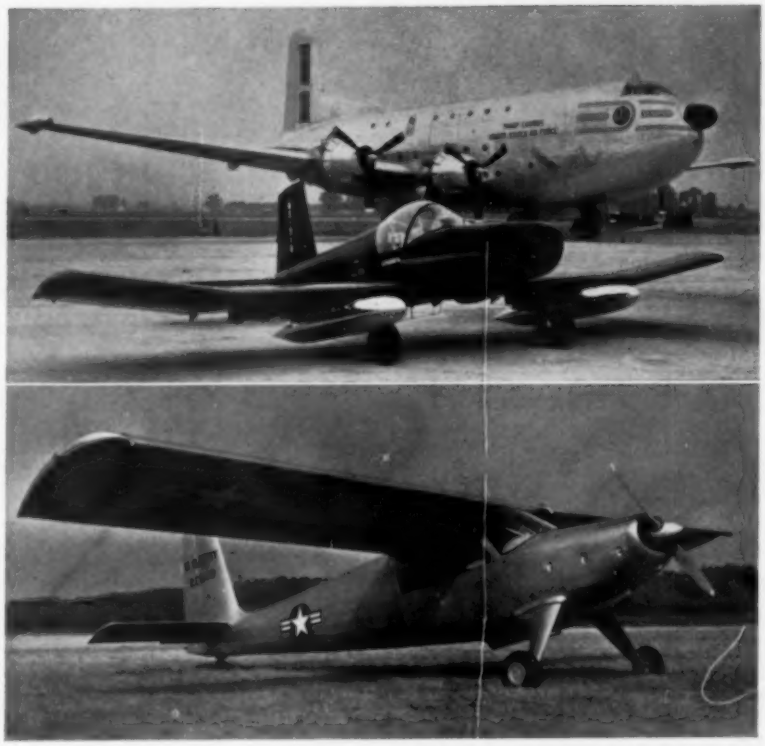
Vickers Viscount. In a recent lecture in the United States, Mr. Arthur E. Raymond, Douglas vice-president engineering, and one of the world's foremost transport designers, described the Viscount as "a little slower than the Constellation or DC-6." This is not factually accurate. In practice, the Constellation is cruised at between 220 and 290 m.p.h. and the DC-6 series at from 255 to 300 m.p.h. The Viscount normally operates its European services at something over 300 m.p.h., and aircraft with the RDa.6 Dart will be rather faster.

Australia

Commonwealth CA-22 Winjeel. Adopted as the standard basic trainer of the Royal Australian Air Force, the Winjeel looks like an angular Provost. Initially powered with a Wasp, later Winjeels will have the Commonwealth Cicada engine, of similar layout. The present contracts call for 62 aircraft, the wings for which are being built by D.H. Australia. A single-stretcher adaptation is also being studied for "Flying Doctor" service.

U.S.A.

Boeing B-47s. For many months rumours have been circulating concerning two developments of the standard B-47 Stratojet. The B-47C is a four-engined experimental development, in which each of the original inner twin-jet pods has been replaced by a large, finely-streamlined nacelle housing a single Wright YT49-W-1 turboprop—a shaft-drive development of the Sapphire turbojet giving about 9,500 s.h.p. Each T49 drives an immense four-blade Curtiss airscrew, with blades having a 2ft chord; studies are now being completed which will determine what type of interference, if any, may be expected between the blades and the leading edge of the swept wing. The B-47D is another four-engined variant, but in this case it is likely that it will go into production. Four single jet pods are fitted, each housing an Allison J71 turbojet, of about 10,000 lb thrust. This great all-steel engine is fully proofed against ice and mishandling by the aircrew, and it has its own accessory systems. The B-47D should be faster than the B-52.



FRONT-LINERS: Two interesting experimental aircraft for front-line work are the Fletcher FD-25B (top) and the Helio Courier. The former is a close-support ground-attack machine (250 h.p. Continental) which may go into production in Japan; a C-124A is seen behind. The Courier, now on U.S. Army test as the YL-24, has a 260 h.p. Lycoming, seats four and can fly at 30 m.p.h.

BRISTOL SYCAMORE HR.50
(Alvis Leonides)
(Royal Australian Navy)
Rotor diameter ... 48ft 7in
Overall length ... 46ft 2in
(rotor folded)

Republic YF-84J. Most important aircraft are, if possible, designed to accept more than one type of power unit, in case one engine should fail to develop as it should or be allocated entirely to a more important design. The normal F-84F Thunderstreak/RF-84F Thunderflash is powered by a Wright J65, and the combination seems to be working well, albeit after some teething troubles in both engine and airframe. Now a prototype YF-84J is flying, in which the power is supplied by a General Electric J73, a big turbojet giving at least 9,200 lb thrust without reheat. There is no immediate production contract for the J subtype, although the performance should be very high. At present the only aircraft using the J73 is the F-86H Sabre.

Netherlands

Fokker F.27. It is unofficially reported that the first prototype F.27 Friendship is scheduled to fly by next April. One fact not immediately apparent is that the Friendship has a wing span greater than that of a Viscount, although it has only two Darts instead of four; all-up weight is, of course, less (32,700 lb against 57,000/60,000 lb).

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operational diversity...

The Fairey 'Gannet' is equipped for a remarkable variety of duties and is in the widest sense a multi-role aircraft. Its design provides for every type of anti-submarine duty, whether the changing pattern of attack calls for extreme range or extra-heavy warload, for speed in pinning down a target or extended endurance for patrol. Compact design and twin-engined performance enable the 'Gannet' to counter most effectively the underwater challenge to our sea communications.

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GYRON

AUSTER A.O.P.9

An Entirely New Rearsby Product, Bombardier-powered, for the British Army

IT is a widely known, and often deplored, fact that there is now only one manufacturer of light aircraft in Britain —though fortunately that firm is Auster Aircraft, Ltd., of Rearsby, Leicestershire. It is less well known that every air observation-post aircraft used by the British Army is, and always has been, of Auster manufacture. Thus, the company can fairly claim to know this particular field extremely well.

Briefly, the history is that the original Model D was, with slight alterations, produced in numbers for the Army as early as 1940. The principal developments since that date are the Auster III (rear fuselage cut down, cabin transparency increased, power unit Cirrus Major), the Auster IV and V, with the American Lycoming engine (225 of the former and 790 of the latter were built, many of which are still in use in various parts of the world), the post-war A.2/45 (a big, stalky aircraft to a difficult specification, which resulted in a high all-up weight necessitating a Gipsy Queen as power unit), and the A.O.P.6, the standard A.O.P. machine, of which some 500 are now in service, with variations, in many parts of the British Empire as well as in Canada, Jordan (Arab Legion), Greece, Belgium, Indonesia and elsewhere.

The A.O.P.6 has the 145 h.p. Gipsy Major 7 with a cartridge starter, and it introduced auxiliary aerofoil flaps, the effectiveness of which went far towards compensating for the increased all-up weight. Two seats are fitted side by side, together with full radio, and there is also a dual-control trainer variant styled T.7. Some Austers of these marks have been produced with ski or float undercarriages.

Although undoubtedly a fine aircraft, and probably the best "buy" in its class in the world, the A.O.P.6 is by no means the ultimate aircraft for Army work. By 1949 the Auster company, the Army and the M.o.S. got together to see what could be expected of future equipment. At this time Blackburn and General Aircraft were just getting the Bombardier into a fully developed state, and this exceptionally promising engine, with lively throttle response, appeared a natural choice for use in future A.O.P. machines. As an interim development and demonstration prototype the Auster Model S was produced in 1951, with a Bombardier 702, large low-pressure tyres, and more powerful tail control surfaces; a Bombardier was also installed in a production A.O.P.6.

The Model S indicated that the company were thinking along the right lines and that a very useful aircraft could be designed around the Bombardier power plant. Accordingly, during the last two years, the Auster design-staff have been developing an entirely new aircraft styled A.O.P.9, with the company's type number B.5; this machine is so promising and so different from its predecessors that we are according it a full description now that the prototype is flying.

It is most important to know that, unlike all other British A.O.P. aircraft, the Mk 9 has not "just growed"; it is a highly coherent design, conceived and developed from scratch on an entirely new basis by an energetic team under the company's chief designer, Mr. R. E. Bird. As the photographs show, it looks quite different from its predecessors. It is actually even more different than its appearance might suggest, and undoubtedly is a highly promising basis for future developments in many fields. Indeed, we shall be most surprised if it does not become the patriarch of a large family of exceptionally capable aircraft, able to tackle an immense range of tasks better than can any other machine of comparable size.

The essence of the design hinges upon the following factors: a fuselage 46in wide (i.e., considerably wider than any previous Auster); an excellent undercarriage, embodying Dowty Liquid Springing and Goodyear disc brakes; a cut-down rear fuselage and extra bulbous canopy, giving superb vision; provision for three seats with full military radio; a large wing with highly effective flaps and drooping ailerons; and a considerably revised structure, including a wing having a metal torsion-box leading-edge of D section and a single strut, a cantilever stressed-skin tail unit, and seats and flooring of honeycomb sandwich material, the floor being so arranged that it can readily be taken out and replaced by alternative prefabricated sections fitted with various types of operational gear. A description of the aircraft follows.

The wings are significantly larger in area than those used in previous Auster aircraft. The section is constant from root to tip (it is the familiar N.A.C.A. 23012) with 1½ deg washout built-in during the assembly of the torsion box. The single spar in each semi-span has a sheet web and T-section booms, and to its forward face are riveted a series of pressed-sheet nose ribs which carry a 2in-diameter light-alloy tube at their forward ends, the tube establishing the position and profile of the leading edge. The torsion box is then completed by pop-riveting the pre-formed skin, in two sections on each semi-span, the inner portion being of heavier gauge.

The pressed-sheet ribs are cantilevered off the rear face of the spar web. As the large drawing shows, the ribs are cut off by the perforated-sheet flap and aileron shrouds, which are fabric-covered on both sides. Drag loads are taken by a diagonal tubular strut inside the wing. Aft of the spar, the wing is covered with doped fabric, which is attached in the very neat manner shown in the detail sketch on p. 763. The wing tip is a single Durestos moulding, produced in the Auster plastics shop, which is screwed to a flange on the end rib. The forward end of each tip is a large transparent fairing for a powerful light which does duty both as a

AUSTER A.O.P.9 . . .

taxying lamp and landing lamp.

The root of the starboard wing houses the single fuel tank, of 16 Imperial gallons capacity. A flexible bag-type tank by Marston Excelsior, Ltd., it rests on a smooth perforated-sheet floor and has a self-sealing, reinforced bottom and side-walls. The top of the bag is thin and pliable and it is attached to the underside of the tank-bay door, which supports it when the tank is empty; this door is the only metal-covered part of the wing aft of the spar.

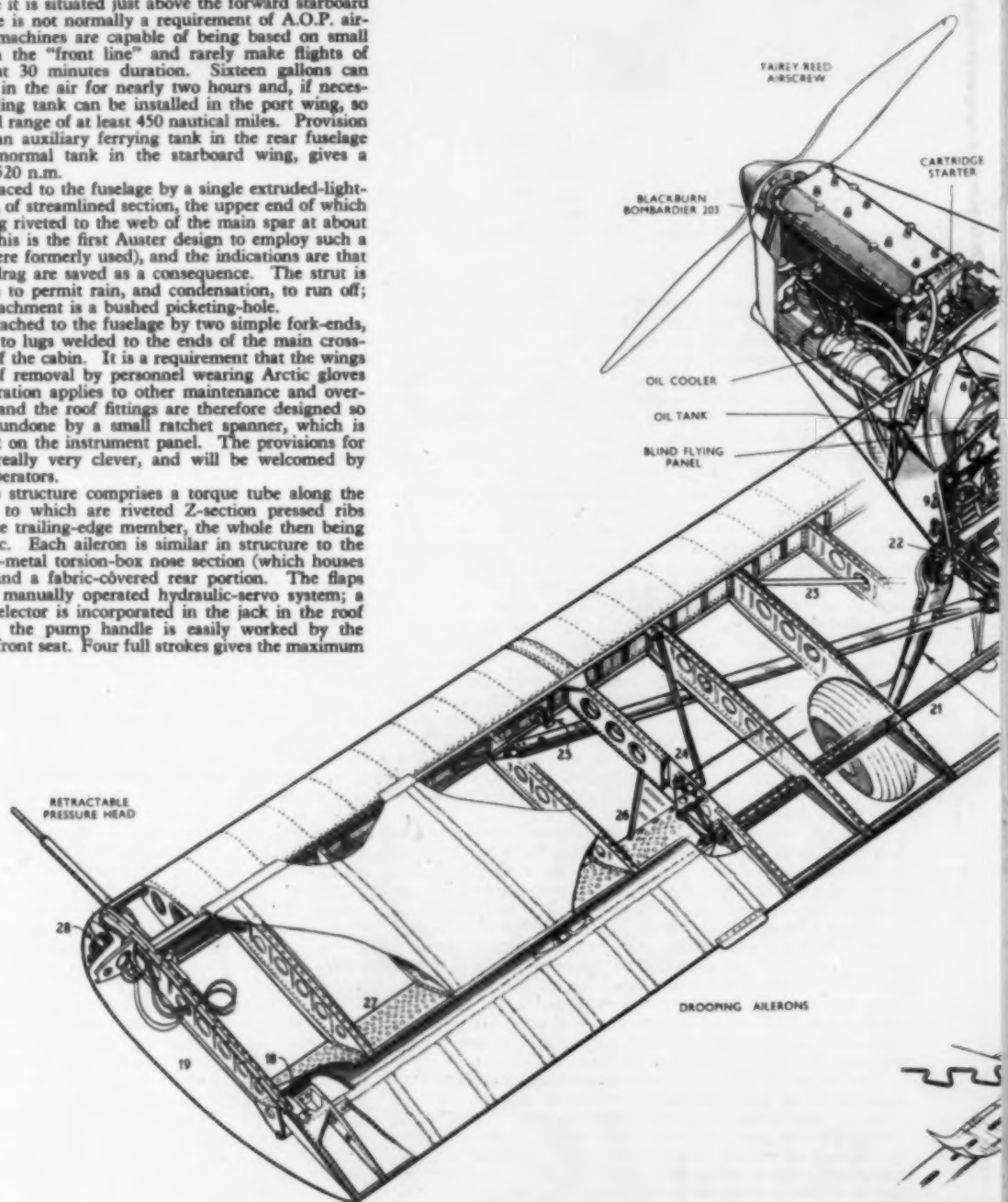
The tank can be easily filled from above, and it has a drain through the lower wing surface and a gravity feed to the engine. The contents gauge is mounted on the wall of the tank adjacent to the starboard wing root, and it can thus be read directly in the cockpit, where it is situated just above the forward starboard door. Long range is not normally a requirement of A.O.P. aircraft, since such machines are capable of being based on small strips right up in the "front line" and rarely make flights of greater than about 30 minutes duration. Sixteen gallons can keep the A.O.P.9 in the air for nearly two hours and, if necessary, a corresponding tank can be installed in the port wing, so giving a theoretical range of at least 450 nautical miles. Provision is also made for an auxiliary ferrying tank in the rear fuselage which, with the normal tank in the starboard wing, gives a ferrying range of 520 n.m.

Each wing is braced to the fuselage by a single extruded-light-alloy tubular strut, of streamlined section, the upper end of which is attached to a lug riveted to the web of the main spar at about 0.7 semi-span. This is the first Auster design to employ such a spar (vee-struts were formerly used), and the indications are that both weight and drag are saved as a consequence. The strut is open at both ends to permit rain, and condensation, to run off; near the upper attachment is a bushed picketing-hole.

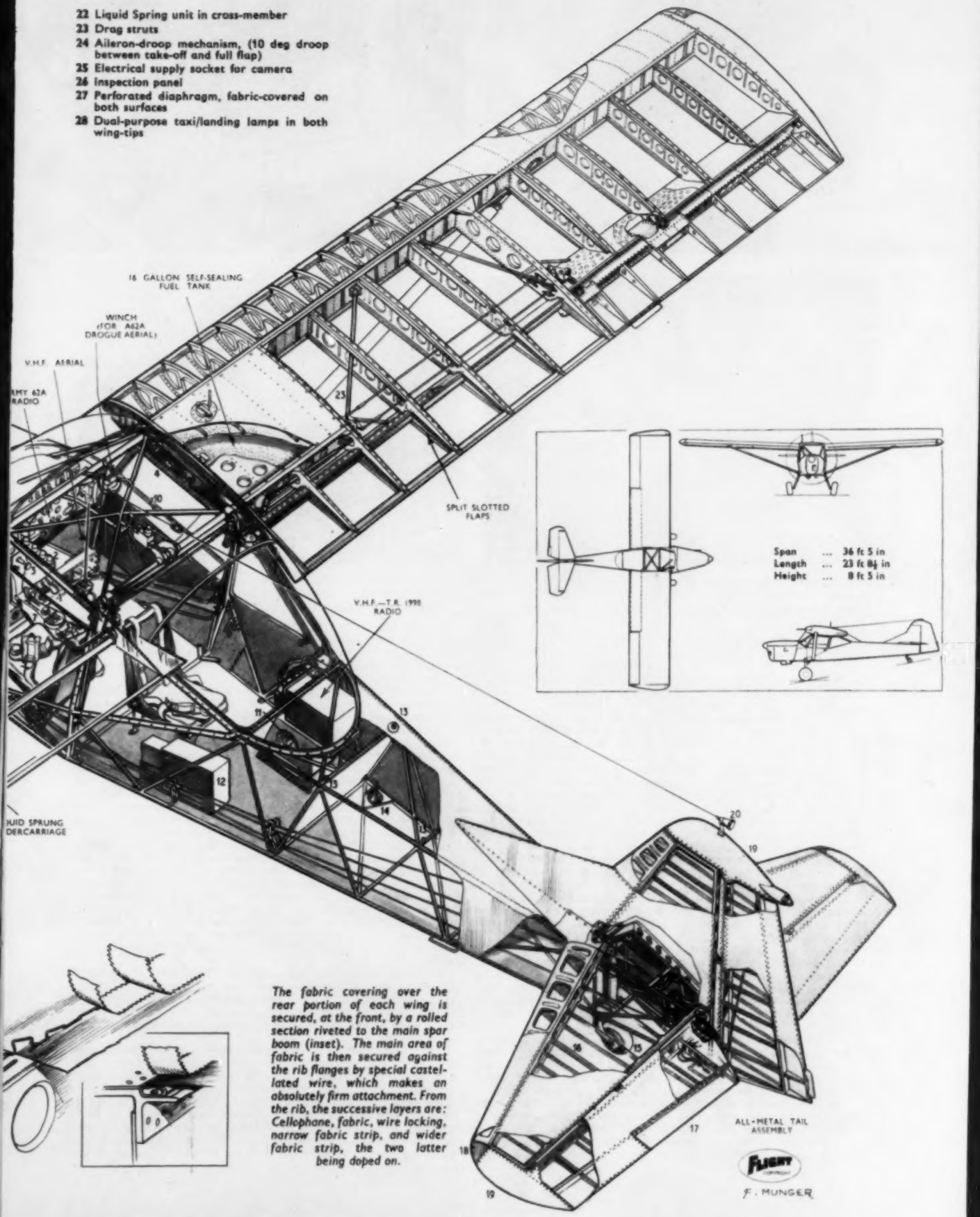
Each wing is attached to the fuselage by two simple fork-ends, which are pinned to lugs welded to the ends of the main cross-tubes in the roof of the cabin. It is a requirement that the wings shall be capable of removal by personnel wearing Arctic gloves (the same consideration applies to other maintenance and overhaul procedures), and the roof fittings are therefore designed so that they can be undone by a small ratchet spanner, which is carried in a pocket on the instrument panel. The provisions for maintenance are really very clever, and will be welcomed by the 9's eventual operators.

The simple flap structure comprises a torque tube along the flap leading-edge, to which are riveted Z-section pressed ribs located by a simple trailing-edge member, the whole then being covered with fabric. Each aileron is similar in structure to the wing, with a sheet-metal torsion-box nose section (which houses a mass balance), and a fabric-covered rear portion. The flaps are actuated by a manually operated hydraulic-servo system; a simple up/down selector is incorporated in the jack in the roof of the cabin, and the pump handle is easily worked by the occupant of either front seat. Four full strokes gives the maximum

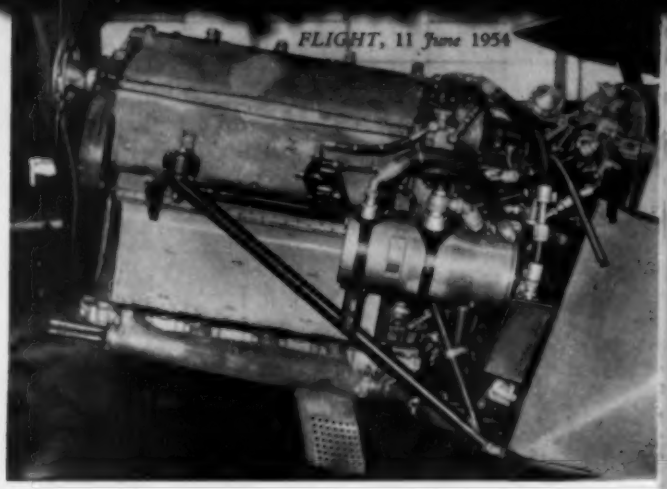
1 Signal pistol
2 Signal cartridge stowage
3 Throttle (plunger-type, push to open)
4 Fuel contents gauge
5 Flap pump and jack unit in roof
6 E.2A compass
7 Console (tail trim, oil-cooling air, Kigass pump, fuel cock, extinguisher)
8 Hydraulic toe-brakes
9 Door-jettison levers
10 Upper portion of windows hinge upward and outward for direct vision
11 Accumulator for radio
12 First-aid and emergency equip
13 Rigging points
14 Downward-identification light
15 Steering tail-wheel
16 Stiffeners Reduxed to skin
17 Durestos trim-tab
18 Mass-balance weights
19 Durestos tips
20 Aerial Drogue
21 Flap Torque-tube



22 Liquid Spring unit in cross-member
23 Drag struts
24 Aileron-droop mechanism, (10 deg droop between take-off and full flap)
25 Electrical supply socket for camera
26 Inspection panel
27 Perforated diaphragm, fabric-covered on both surfaces
28 Dual-purpose taxi/landing lamps in both wing-tips



The fabric covering over the rear portion of each wing is secured, at the front, by a rolled section riveted to the main spar boom (inset). The main area of fabric is then secured against the rib flanges by special castellated wire, which makes an absolutely firm attachment. From the rib, the successive layers are: Cellophane, fabric, wire locking, narrow fabric strip, and wider fabric strip, the two latter being doped on.



With the three doors removed (upper left), the generous capacity of the new aircraft can be appreciated, as can the exceptionally high order of all-round visibility. The Bombardier (above) promises to be a most suitable power unit; the upper view shows the cartridge starter (top right), oil tank and other details. Lower left is shown the pitot head in its retracted position, the Durestos tip and dual-purpose light

AUSTER A.O.P.9 . . .

flap position of 50 deg, although flap can be put on in small inching strokes if preferred. An outstanding fact is that application of flap calls for no change in trim at any airspeed.

The system employs normal hydraulic fluid, and is irreversible and the flaps therefore stay at any angle at which they are set. The flaps themselves can be clearly seen by the pilot but, in accordance with requirements, an indicator is provided on the facia panel, with a pointer sliding over a scale of degrees. As the flaps are lowered, a cam mechanism causes the ailerons to droop in sympathy (to a maximum of 10 deg, reached at the take-off flap setting of 27 deg) so improving both lift and drag at slow speeds without losing anything in the way of lateral control. When the flaps are selected "up" in the air the slipstream brings them fully up in under three seconds, with little sink.

An electrically heated pitot tube is mounted on the port wing-tip. As an Army life is likely to be severe, the whole tube retracts into the wing when an unlocking ring is pulled, this being a standard drill carried out after landing to prevent ground-handling damage. The position-error is no greater than two or three knots at any time, and the instrument reads reasonably well with the tube retracted.

The tail unit is a cantilever, stressed-skin assembly, and it is thus a complete break-away from all previous Auster practice. The fin and tailplane each have two channel-section spars to which are attached two ribs only, at the root and tip locations. Between these ribs, the profile is maintained by curved chordwise stiffeners Reduxed to the skin, so preserving a very smooth surface. Austers have made all the tooling for this tail, and will shortly do the Reduxing as well, although Aero Research, at Duxford, did it for the prototype tail surfaces. The leading edge of each fixed tail-surface is also rib-free, and is stabilized by a Reduxed interior stiffening skin made of perforated sheet. In spite of its simplicity and light weight, this tail is extraordinarily rigid and strong.

The horn-balanced elevators and rudder are of similar construction, with two spars and a skin stiffened with Reduxed chordwise stiffeners. The tips are similar to those of the wing, being one-piece Durestos mouldings. Each of the three movable tail-surfaces can be rapidly removed, without affecting the control circuits, merely by undoing one nut and sliding the surface off spigot hinges. The rudder has a ground-adjustable tab, and the port elevator carries a large trimming tab actuated by a lever on the cockpit console.

The basic fuselage structure follows established Auster practice in being a very strong assembly of welded steel tubes. Quite new, however, is the floor, which (although it forms part of the load-carrying structure) is made in three quickly removable sections; each of them can be replaced by a corresponding portion mounting special operational equipment. A corner of one of these panels is shown at the foot of p. 763; the material used is Dufaylite, a 1in-thick sandwich composed of the following "slices," reading from the outside skin: a sheet of duralumin, a Reduxed veneer, a honeycomb of resin-bonded paper, another veneer, a top duralumin sheet and a final inner layer of rubber to resist wear in the cockpit and preserve a good-looking interior.

These sandwich panels are edged with metal channel-section and have reinforced corners to carry the attachment loads into the whole panel. Local reinforcement is also provided at the appropriate points for military gear and for the seats; the latter are attached by four pins passed through the pick-up points for each seat, thus permitting the whole floor to be cleared completely in well under a minute. The seats themselves consist of Dufaylite panels held in a sheet assembly, and the rear seat—that for the look-out man in the A.O.P. rôle—can be swivelled round to face to the rear.

No fewer than three large doors are fitted (two to starboard) giving exceptionally easy access. Each has a large window, the top portion of which can be folded upwards, or fixed in any intermediate position, to provide direct vision. The machine can be flown with a door removed and, in emergency, all doors can be jettisoned.

All-round vision is, of course, first-class. Moon Aircraft make the canopy, which is assembled from Perspex mouldings to give a smooth profile; particularly worth noting is the one-piece windscreen, which includes the forward portions of the wing roots. View to the rear has been enhanced by cutting down the rear top decking, and side area at the rear has been increased by fitting a dorsal fin which maintains stability even in extreme sideslips. The fuselage is fabric-covered aft of the main bulkhead (in line with the undercarriage); the forward portion is metal skinned

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The flying-boat

FORGOTTEN FACTOR IN DEFENCE

At the present time, the air defence of Britain's sea-lanes and Britain's ships as they sail on their lawful occasions is broadly dependent upon a landplane — the Shackleton *— and a flying-boat whose basic design is twenty years old — the* Sunderland.

Why is it that the flying-boat has been so neglected in recent years? It is chiefly because World War II left us with a profusion of ready-made runway aerodromes — and there was no flying-boat modern enough to compete with post-war landplanes.

When we bowed to these circumstances we risked a great deal. We jeopardised the very knowledge and experience that enabled us to design in the 'thirties flying-boats that patrolled our seas throughout the 'forties and fought — for the United Nations — even in the 'fifties. And the Sunderland's 1,600 sorties and more than 13,000 hours flying in Korea could not have been achieved by anything but a flying-boat.

Post-war Progress

It is of course true that there have been post-war designs for water-based fighters. There has also been that stately, gleaming beauty, the Saunders-Roe *Princess*. These aircraft, only part of the evidence of two decades of aerodynamic and hydrodynamic research and development work, have kept the flying-boat in the air.

More important still, they have shown publicly the progress made in performance and seaworthiness. Indeed, as a result of research into the hull structures and power plants necessary to meet open-ocean conditions, the whole conception of the military flying-boat has broadened. It is now more efficient as an aircraft, more powerful as a weapon and more adaptable to our future defence needs. Equipped with modern flying-boats, R.A.F. Coastal Command could well become R.A.F. Ocean Command.

The New Conception

The modern flying-boat can operate from any natural stretch of water, in any weather that a landplane can cope with. Its runways and taxi-tracks are free — and bomb-proof.

And while landplane size is already nearly at the feasible limit, due to prohibitive runway costs, the flying-boat can be as big as military and operational requirements demand. Its runways will still be at hand. Its base facilities will still be available at a fraction of the cost of a landplane layout. *It will be able to refuel and rearm from ships in the open ocean, in conditions hitherto impossible.*

Its flexibility is unchallenged. The squadron of tomorrow (it should be today), equipped with its own flying maintenance men, its own inflatable sectional pontoons, could take off, fly to the other side of the world, establish its own base and operate independently. This same flexibility could be applied to the immediate transport of troops to almost any area where armed aid is urgent.

Servicing?

Relatively easy, with new and up-to-date methods. The flying-boat has no heavy and complicated undercarriage mechanism and needs to come out of the water only occasionally. Routine maintenance can be done afloat.

WHAT IS YOUR *VERDICT? DO* YOU *THINK WE ARE WISE TO NEGLECT THIS FINE DEFENSIVE WEAPON?*

An announcement by **SAUNDERS-ROE**

COASTAL COMMAND

The Short Sunderland *— the Commonwealth's most up-to-date military flying-boat. A fine aircraft — but twenty years old in basic design.*

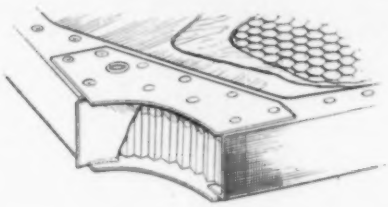
OCEAN COMMAND

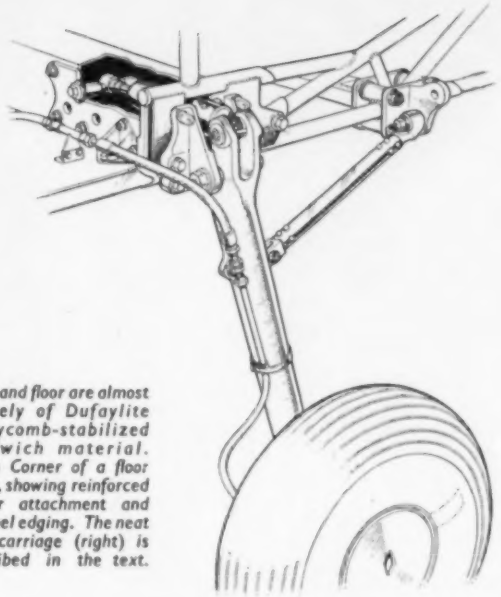
The latest operational needs are anticipated by Saunders-Roe in this independent and adaptable Ocean Patrol and Transport project.

and terminates in a stainless-steel firewall behind the power unit.

As stated earlier, the engine is a Blackburn Cirrus Bombardier 203; this is an ungeared, unsupercharged, direct-injection, inverted four-in-line unit, which gives a rated power of 173 b.h.p. on M.T. fuel. Use of this fuel establishes a precedent, although there are indications that, in actual service, aviation petrols proper might be more readily available; with such fuels the Bombardier may shortly be cleared for powers in excess of 200 b.h.p., which should make the A.O.P.9 exceptionally lively.

The engine drives a Fairey-Reed fixed-pitch lightweight steel airscrew, and is mounted on resilient-rubber bushes carried on a pair of simple tubular assemblies which are, in turn, attached to the firewall by four ½in bolts. Torque is countered by offsetting the engine to port and the fin to starboard.





Seats and floor are almost entirely of Dufaylite honeycomb-stabilized sandwich material. (Left) Corner of a floor panel, showing reinforced corner attachment and channel edging. The neat undercarriage (right) is described in the text.

Cooling air enters the port side of the nose cowling and issues from the large cut-away portion on each side of the front fuselage. Intake air enters under the cowling and passes through a special Auster-made assembly, incorporating flaps and Vokes filter elements, which is governed from a cockpit control providing for hot, cold and filtered air. (The Bombardier is not susceptible to icing, owing to the direct-injection system.) Austers also make a de-aerator for the fuel system, gravity-fed from the main tank, which ensures a continuous bulk supply of fuel upon which the injection pump can draw.

The Bombardier is started by a Plessey-Coffmann cartridge starter, the breech unit of which houses six cartridges indexed and fired from the cockpit. With Kigass priming and oil dilution, it is stated, the engine invariably starts "on the first bang" in all climatic conditions down to −40 deg C. The cabin-heating system will be welcomed, particularly because its capacity is, if anything, more than adequate. Air for this service is rammed in through a heat-exchanger jacketing the exhaust manifold, and is then ducted into the cabin along two flexible pipes, one of which releases air at foot level and the other demists the windscreen.

The oil tank is mounted on the lower front face of the firewall, and it is connected, *via* an anti-surge valve, to a large cooler on the port side of the engine. Engine-driven accessories include a Plessey-supplied vacuum pump and a Rotax 24V 500W D.C. generator.

The characteristics of the undercarriage assume a special importance in an aircraft of this type, which must be able to sit down squarely in unprepared fields. Austers consider the A.O.P.9 to have the best gear yet devised for such work. The main legs are single light-alloy forgings, braced by a short drag strut and pivoted laterally to forged lugs bolted to the fuselage, at the ends of the main shock-truss. This truss houses two Dowty Liquid Spring shock-absorbers mounted horizontally, each of which is coupled to an arm on the main leg.

The wheels, the large low-pressure tyres and the single-disc hydraulic brakes are all by Goodyear, the brakes having glass-fibre shrouds to prevent collection of grass or abrasive particles. The levered-suspension tailwheel unit is also sprung with a Liquid Spring, and is fully castoring. Altogether, the performance of this landing gear appears outstanding. Designed to accept a rate of descent of 9 ft/sec, it is strong, light and has little drag; Ranald Porteous, the company's well-known test pilot, has found that he can "clump it down on any surface and tread on the brakes"—something which was formerly impossible owing to the rebound. The mainwheel brakes are toe-operated and the tailwheel is steered by the rudder pedals.

The fuselage is appreciably wider than that of any previous A.O.P. design (in the world, we believe) and has an outstandingly adaptable interior. The pilot sits to port, the observer is behind, near the centre-line, and the front starboard seat is for occasional passengers. Although full details have not yet been worked out, the interior will certainly be capable of being rapidly converted for use in freight, supply dropping, ambulance or casualty-evacuation, and other rôles.

Between the front seats is an "airline-type" control pedestal, upon which are mounted the fuel cock, tail-trim lever, Kigass pump, engine-air control and fire extinguisher. The left side of the main panel contains a full blind-flying panel (except for a rate-of-climb indicator, redundant in A.O.P. work). Also facing the pilot are engine instruments, and a Kelvin and Hughes baby compass is mounted on the Durestos top scuttle, together with electrical switches; below are the throttle lever, cabin-air and oil-cooler controls and the parking-brake knob. To the left is the cartridge starter pull-ring, and each door has a black-and-yellow-striped jettison lever.

The starboard side of the facia is a large Durestos recess, into which fits an Army Type 62 m.f. communications set; the aerial for this well-known radio consists of a drogue-stabilized trailing wire which can be winched out some 150ft. In the rear fuselage is a remote-controlled T.R.1998 v.h.f. set, mounted on a rack above a high-capacity accumulator. This set is served by a whip aerial. An intercom mixing box can be used with either installation, and a press-to-speak switch is mounted on the top of the control column.

Other standard fittings include variable-intensity compass and instrument lighting, camera heating, a downward-identification light, a large map pocket, stowage for six spare starter cartridges, a crowbar, a signal pistol and ammunition, and a lightweight step for refuelling. Although not currently a requirement, there seems to be no reason why other gear should not be developed, including underwing racks, spraying gear, and full dual controls.

The prototype A.O.P.9 flew on March 19th, and trials have since progressed very well. Several more are in the shops, and the current Army order for production aircraft will help to keep Austers busy for a considerable time. The new aircraft has a very pleasant and distinctive sound, with which visitors to this year's Farnborough Show may be able to become acquainted.

AUSTER A.O.P.9 DATA (PROVISIONAL)

Blackburn Cirrus Bombardier 203 (173 h.p. on M.T. spirit)

Span, 36ft 5in; length, 23ft 8¼in; height (airscrew horizontal), 7ft 2¼in; wing area, 197.6 sq ft; empty weight, 1,461 lb; disposable load, 589 lb; all-up weight, 2,050 lb; wing loading, 10.4 lb/sq ft; power loading, 11.9 lb/b h.p.; take-off distance to 50ft under 260 yd; rate of climb (sea level), 930 ft/min; rate of climb (5,000ft), 660 ft/min; time to 5,000ft, 6.4 min; normal cruising speed, 99 knots; service ceiling, 19,200ft; operational range, 214 nautical miles; ferrying range at 80 knots, 520 n.m.

Note: All the above figures would be greatly improved with a more powerful Bombardier variant running on true aviation fuel.

AIR SURVEY BOARD CHANGES

THE Fairey Aviation Co., Ltd., announces changes which have been made to the Board of its subsidiary, Air Survey Co., Ltd. Mr. C. H. Chichester Smith has retired from the chairmanship and Board to enable him to concentrate on the work of the weapon division of the parent company. G/C. F. C. V. Laws has been appointed chairman of the survey company and has been succeeded as managing director by Col. R. T. L. Rogers. Mr. C. W. Hall, a director of the parent company, has been elected as an additional director to the survey company.

The Board of Air Survey Co., Ltd., now consists of G/C. F. C. V. Laws, C.B., C.B.E., F.R.P.S. (chairman); Col. R. T. L. Rogers, M.A., F.R.I.C.S., R.E. retd. (managing director); Mr. J. C. Macpherson, A.C.A.; Mr. R. Fairey; and Mr. G. W. Hall, A.F.R.Ae.S.

Practically the whole of the 96-acre "lot" upon which the new de Havilland Aircraft of Canada plant is situated is shown in this aerial view of the south-west end of Downsview Airport, Toronto. Note the relative size of Otters and Beavers seen on the tarmac—and, incidentally, the quick get-away car-parking arrangements.

D.H.C. IN THEIR NEW QUARTERS

SINCE the beginning of this year the de Havilland Aircraft of Canada, Ltd., have been in occupation of their attractive new factory at Downsview Airport, just outside Toronto; many people will remember this R.C.A.F. base from war-time experience. The aerial view presented above gives a better idea than could any verbal description of the layout and appearance of the 9½-acre plant, from which are now emerging both Beavers and Otters.

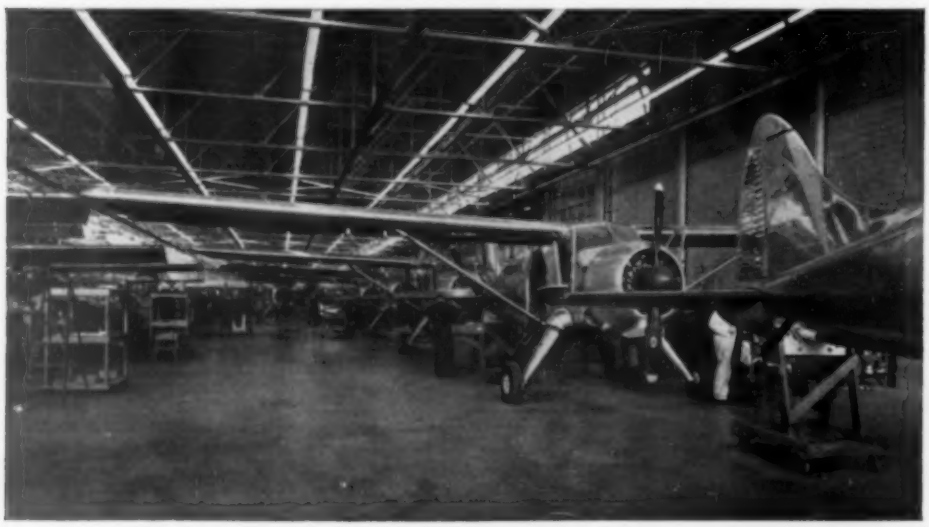
In addition to the primary production work of the Canadian company, overhauls of Vampires and other D.H. aircraft (up to and including the R.C.A.F. Comets) are undertaken. Preparations are also in hand for the work of assembling 100 Grumman S2F anti-submarine aircraft for which a contract was recently placed on behalf of the Canadian Navy.

A visitor to the new D.H.C. factory is impressed not only by the very pleasant, modern working conditions in every department, but by the air of confidence and solidarity. In obtaining substantial orders for Beavers not only for the American Air Force (this version is known as the liaison/cargo L-20) but also from civil operators in many countries, and in following up this versatile design with the somewhat similar but larger Otter, D.H.C. have succeeded in establishing a sound commercial basis for operations that is the envy of other manufacturers.

The sale of Beavers in the highly competitive American market was a remarkable achievement which served to confirm the outstanding qualities claimed for this aircraft.

A new picture of R.C.A.F. Otters appears elsewhere in this issue. The latest Beaver variant is a promising agricultural combination model, adapted for spraying, fertilizing, seeding and supply dropping.

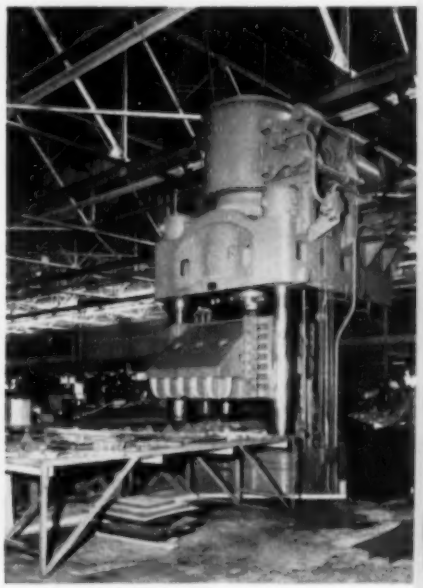
D.H. Canada celebrated its twenty-fifth birthday last year.



A portion of the Beaver assembly line in the new factory.

Various D.H. and D.H.C. products around the flight hangar, adjoining which are the test pilots' offices.

Part of the drawing office, situated at the top of the administrative block.



A new 3,500-ton rubber press.

Otters nearing completion at the end of the Downsview assembly line.

AIRCRAFT in AGRICULTURE

Aerial Topdressing in New Zealand : Further Extracts from Sydney R.Ae.S Symposium

WITH the title "Aircraft in Agriculture," a symposium was held at the 71st meeting of the Sydney Branch of the Royal Aeronautical Society (Australian Division) recently. Extracts from three of the papers presented were given in last week's issue: abstracts of the remaining contributions follow.

Impressions of a Topdressing Pilot.—When a suitable pilot applicant joins a topdressing company, it is useful for him to gain the general atmosphere and operating procedure on the job by, say, driving an aircraft-loading truck for a short period. During his first week or two he will undergo a general flying test with the chief pilot of the company.

It is up to the operator to judge accurately, after a reasonable period of time, whether this chap is going to become quite a suitable topdressing pilot or not. If not, then the chap himself must be firmly and sensibly convinced by his employer that he is running a grave risk of being injured (or even killed) unless he transfers his flying efficiency into another branch of civil aviation. It is extremely important that the operator assesses the all-round ability of his new pilots and acts accordingly. When the employer is satisfied that he has another potentially permanent flying member on his staff, the next stage in training is extremely important. He must work in conjunction with another experienced pilot on the same job, and the strip they are operating from must be a good one, in terms of length, width, clear getaway and approach, and suitability of the surrounding terrain for satisfactory overshoots.

It is extremely advisable that these pilots work together for at least thirty to fifty hours on flying operations before the new man is sent away with his own unit.

Unfortunately, this aspect of a new topdressing pilot's training has been, and still is, neglected by some operators. Due to continuous unfavourable flying conditions, the operator gets rather behind schedule with his commitments, and in the meantime a new pilot is taken on the staff and is rather hurriedly put out into the field to take part in operations and, the next thing that happens, he runs out of strip taking off with a load; or stalls the aircraft up in the hills somewhere while climbing hard with a full load and turning *downwind*; or attempting to sow while flying up a steepish long ridge; or sowing up a blind gully and only realizing at the last moment that he is in for a lot of bother in attempting to turn and get back out of the gully.

It is very important in a topdressing pilot's early training that the company's operations manager should ensure that the new pilot can successfully complete his first several jobs, or thirty to fifty hours' flying, from all-round strips. Many operators claim that this is impossible, but it must be done if the employer has any respect and consideration at all for his new, untrained pilots.

Concerning the type of aircraft used, Tiger Moths have accomplished, and still are accomplishing, the majority of the work in New Zealand. They have done a wonderful job, carrying 540 lb of fertilizer on every trip, averaging around fourteen trips per hour, being tied down in the open overnight in all weathers, receiving a minimum of maintenance attention while on the job, and returning to base for routine checks and inspections only. It has been fairly obvious for the last year or so that the Tiger Moths will gradually have to be replaced with a more modern aircraft carrying a heavier load. The Cessna 180 and the Canadian D.H. Beaver are two of the modern types at present being used for topdressing by several operators, the Cessna carrying 1,000 lb and the Beaver 1,700 lb. Experience with both Tiger Moths and Beavers has shown the Beaver to be an outstanding aircraft in every respect, and eminently suitable for topdressing operations from short strips in rugged country. It has been proved that the Beaver will operate from strips that prohibit the use of Moths, even lightly loaded. Certainly the Beaver pilot is considerably busier than the Tiger pilot while on operations, due to his cockpit drill, which must be 100 per cent correct at all times.

A common remark that is addressed to pilots on this work is: "Isn't it monotonous going in and out all day from a strip?" Definitely not, if the pilot doesn't allow himself to become complacent and easy-going towards the job and, instead keeps his interests aroused and airmanship knowledge to the fore. Each particular take-off, approach to the dressing area and landing back on the strip is a definite job of its own—in other words, every trip is different, changing wind-speed and direction necessitating the pilot utilizing his airmanship knowledge to the full.

A topdressing pilot's life is very interesting, involving moving around the country from one job to another, operating from various types of strips, and meeting different people. The non-flying side of the job is interesting, too; if, for instance, the job is some distance from the base field, one lives at the homestead with the farmer or station owner and his family.

An Appreciation of Aircraft in Pest Control was given by Mr. S. L. Allman, chief entomologist of the N.S.W. Department of Agriculture. "The use of aircraft in pest control," he stated, "is now well established in the U.S.A., England and other countries, and the techniques for spraying, dusting or baiting have all been reasonably well worked out. The appeal of aircraft for pest control is almost universal and to many it is a matter of surprise that more general use of this method is not made in this State. This surprise is voiced particularly in periods of urgency when some widespread pest is evident in plague form. This outlook was emphasized recently in the call for aircraft to deal with migrating grasshopper swarms, although practical considerations dictate that prevention on the ground is the cheapest and most effective way of dealing with this problem."

Mr. Allman went on to deal in turn with the advantages and disadvantages of aerial pest control, overseas developments, the potential in N.S.W., local instances of pest control by aircraft, and future prospects.

Control of Weeds by means of aerial spraying was described by Mr. K. R. Green, B.Sc.Agri., in two papers concerning the application of herbicides and defoliant chemicals by aircraft. Mr. Green's conclusion was that there was a place for both aerial and ground application of herbicides. Aircraft had a definite advantage where the ground was wet, speed important, the terrain rough or crop damage a factor. Ground equipment had an advantage of cost, uniformity of application and lower drift hazards. Between the obvious fields for each there was a wide zone for active competition. An efficient, low-cost helicopter would overcome many of the disadvantages of fixed wing aircraft and could lead to a rapid increase in the application of herbicides and defoliants from the air.

Use of Aeroplanes in Agriculture was the title of a paper by Mr. T. E. Kitamura, in which convincing examples of the advantages of aircraft for agricultural use were given. After dealing with the factors of time and inaccessibility, the paper concluded:—

"Where the 'time' or 'inaccessibility' factors operate they can operate absolutely in favour of the aeroplane regardless of price. Where the aircraft must compete on even terms with ground machines, their success will depend largely on organization and the efficient use of those factors which favour them.

"The spraying of large areas for the control of insects, of vermin or of fungi gives the aircraft a tremendous initial advantage because of the speed at which it can work. On the other hand the operation of the 'time' factor makes it imperative that the job be done within a particular period. This operates against the aircraft and favours the use of farmer-operated units. The solution, of course, is to use enough aircraft to cope with the job to be done. This in turn means a heavy capital outlay. This has and is being done in America with businesslike organization and it should be possible here. The farmer already realizes that there is a big field for the economic use of aircraft in agriculture in Australia. The successful development of this field now depends on the investing public."

The Agricultural Aeroplane was the title of the comprehensive final paper, extracts from which follow.

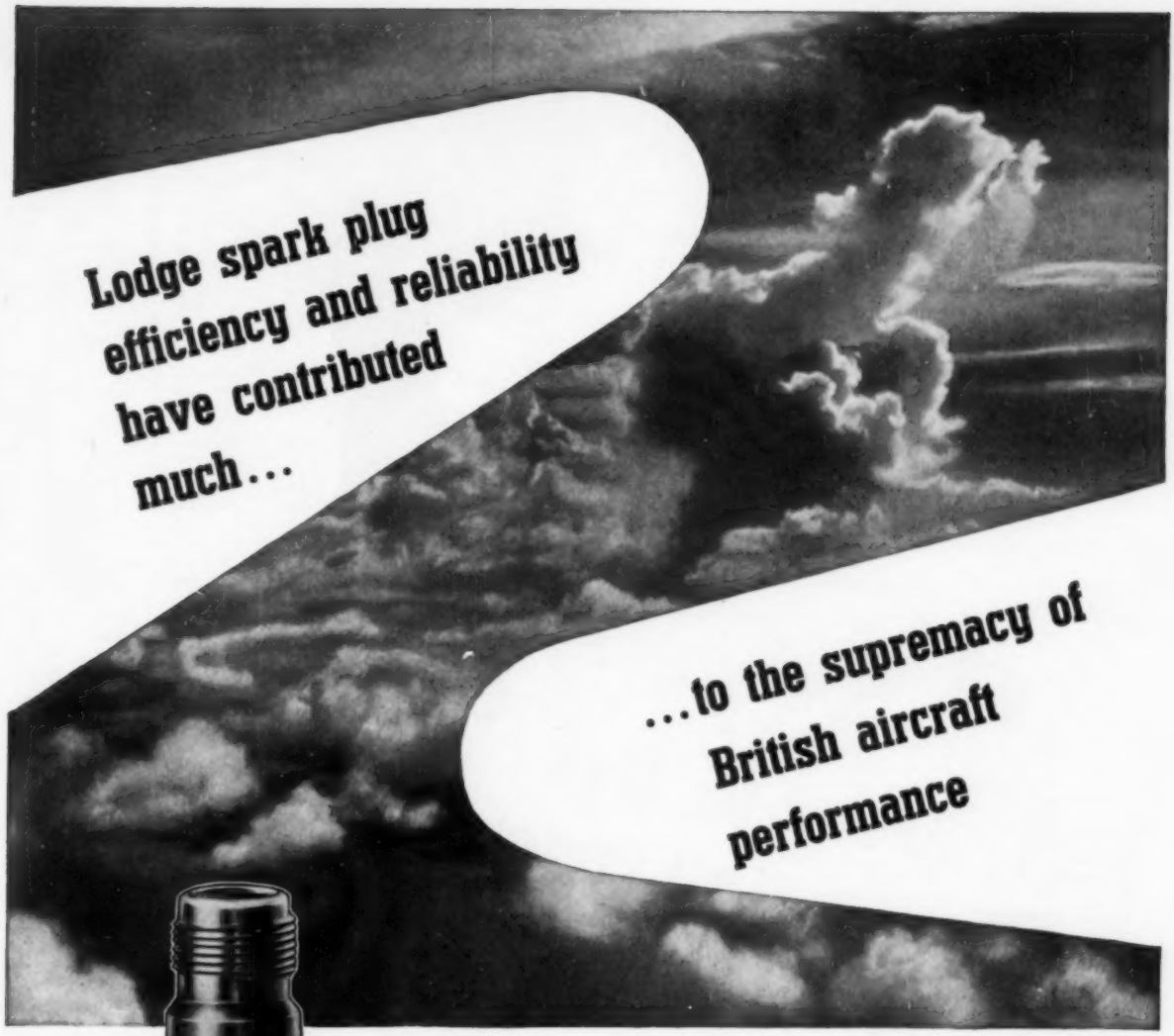
Agricultural work in which aircraft are engaged can be classified in four main types, viz., pest control, fertilizing, sowing and defoliation, of which pest control is by far the largest task.

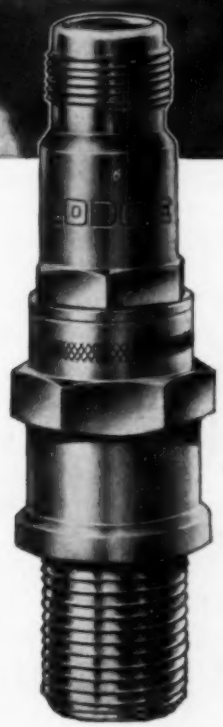
The qualities required of a suitable aircraft for general agricultural use may be listed as follows:—

(1) Because of the low flying involved, a lot of thought is needed to provide protection for the pilot in case of engine failure or misjudgment causing a forced landing, as he will have no choice of landing place.

(2) Because the risk of damage is greater in this work the aircraft should be as cheap and easy to repair as possible, with a maximum of interchangeable parts consistent with the other requirements.

(3) Because time spent on the ground is waste time and because materials are quickly distributed, it is necessary to





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AIRCRAFT IN AGRICULTURE . . .

TABLE I: FIXED-WING AIRCRAFT

Aircraft	Engine	Weight (lb) Empty	Weight (lb) Loaded	Wing Loading (lb/sq ft)	Power Loading (lb/h.p.)	Speed (m.p.h.) Stalling	Speed (m.p.h.) Cruising	Take-off distance (yd)	Initial rate of climb (ft/min)	Payload (lb) (unequipped)	Assumptions
Prestwick Pioneer	Leonides (540 h.p.)	3,826	5,400	13.15	10.31	38	140	230 (to 50ft)	—	1,090	40 gall fuel, 4 gall oil, 160 lb pilot
Auster J.5	Gipsy Major (130 h.p.)	1,162	2,100	11.35	16.0	30	100	160	650	652	15 gall fuel, 2 gall oil, 160 lb pilot
D.H. Beaver	Wasp Junior (450 h.p.)	2,925	5,100	19.8	11.3	47	140	185	1,020	1,800 (plus 35 cu ft hopper)	20 gall fuel, full oil, 160 lb pilot
Cessna 180	Continental (225 h.p.)	1,460	2,550	14.6	11.3	—	150	—	1,050	798	15 gall fuel, 2 gall oil, 160 lb pilot
Helio	Lycoming (260 h.p.)	1,800	3,000	13.0	11.5	35	150	100	—	905	15 gall fuel, 3 gall oil, 160 lb pilot
Piper P18A Super Cub (Agricultural model)	Lycoming (135 h.p.)	960	2,070	11.6	16.6	45	95	—	680	824	15 gall fuel, 2 gall oil, 160 lb pilot
Fletcher	Continental (225 h.p.)	1,220	2,500	16.3	11.1	35	150	—	1,850	986	15 gall fuel, 2 gall oil, 160 lb pilot
Texas A. and M. College AG.1	Continental (225 h.p.)	1,900	3,400	11.6	15.1	45	100	430 (to 50ft)	600	1,214	15 gall fuel, 2 gall oil, 160 lb pilot

operate as close to the job as practical, and re-loading must be as easy as possible. One-minute turn-rounds are not impossible, and hoppers and tanks should be installed with this in mind.

(4) Structure must be sturdy and simple—this applies particularly to the undercarriage.

(5) Take-off characteristics must be good, the ground run as short as possible and easily controlled, and the undercarriage must be suitable for use on unprepared surfaces (grass, stones, sand or mud as required).

(6) Rate of climb must be good to enable operation in hilly country when required, and to ensure a satisfactory getaway after take-off.

(7) Stalling speed must be low, and there should be good controllability at the stall, with no abrupt change in attitude. Stability must be good, and the machine must be easy to fly.

(8) Good all-round visibility is essential.

(9) Attention must be paid to keeping dust out of the cockpit while re-loading (and in flight). All parts liable to come into contact with chemicals, liquid or solid, must be protected and easily cleaned (this applies particularly to the rear fuselage).

The size of the aircraft must now be considered. It is probable that the optimum payload for all round use is in the order of 2,000 lb which would mean the aircraft would be between 4,500 and 5,000 lb a.u.w. This size is probably larger than a private owner would require and another attractive size would be an aircraft of half this size.

Either machine should be capable of taking off with a ground run of 200 yd—making a 400 yd field safe—and should have an initial rate of climb of 1,000ft per min at sea level.

A survey of the available aircraft show that there are two English, one Canadian and five American types to be examined, and their salient features are listed in Table I.

Comparing these aircraft, and using empty weights to classify them, we have the Auster and the Piper at 1,162 lb and 960 lb carrying 652 lb and 824 lb respectively for much the same performance.

The Fletcher, Cessna, Helio and AG1 at 1,228 lb, 1,460 lb, 1,800 lb and 1,900 lb respectively, carry 986 lb, 790 lb, 905 lb and 1,200 lb with the Fletcher and Helio ahead in performance. The Beaver and Pioneer at 2,925 lb and 3,826 lb carry 1,800 lb and 1,090 lb (unequipped), with performance in favour of the Pioneer though the Beaver would carry double the load.

Commercially, it is probable that the Beaver is the best available aircraft, providing reasonable utilization can be expected, as it carries double the load of the Cessna with similar performance, and more than double the load of the Piper with better performance.

TABLE II: HELICOPTERS

Type	Engine	Weight (lb) Empty	Weight (lb) Loaded	Disc Loading (lb/sq ft)	Power Loading (lb/h.p.)	Payload (lb) (unequipped)	Assumptions
Bell 47	Franklin (200h.p.)	1,380	2,350	2.4	11.75	598	15 gall fuel, 2 gall oil, 160 lb pilot
Hiller 12B	Franklin (200h.p.)	1,656	2,500	2.6	12.5	522	15 gall fuel, 2 gall oil, 160 lb pilot
Bristol 171	Leonides (490h.p.)	3,970	5,400	2.9	11.0	1,054	25 gall fuel, 4 gall oil, 160 lb pilot

Helicopters so far available have been expensive in first cost and in maintenance, but because of advantages in some types of work they are increasing in use—though it is doubtful if they will displace fixed wing aircraft in this field while they are in their present form. Available types are reviewed in Table II.

A comparison of the Bell 47 which has a payload of approximately 600 lb with the Piper P18A with a payload of 824 lb would be in the favour of the aeroplane except in conditions normally favouring the helicopter, and where the downward flow of air from the rotors helps to coat the underside of foliage due to turbulence. Similarly, a comparison of the Bristol 171 and the Beaver would favour the Beaver, except as above.

Comparing the available aircraft with the general requirements that have been specified, we find that price is the feature most criticized. Otherwise, aircraft are available which do the job quite well but, because of their price, we find new aircraft such as the Air Tractor, which has just flown, being produced. It is obviously an aeroplane designed by an enthusiast who has been rather carried away on interchangeability. Information available shows that it carries a load of 2,500 lb, takes off in 300 yd and has a rate of climb of 450 f.p.m. at 1,000ft. It is fitted with a 450 h.p. P. and W. Wasp Junior and, as such, is a Beaver rival.

It is difficult, however, to see how a cheap agricultural aircraft can be built in sterling areas—new engines are all very high in price and this is a very large hurdle indeed.

It would be possible to design a special aircraft which, if the quantities to be produced were reasonable, would be cheaper than existing aircraft, though it seems that the saving would not be of any magnitude unless a low-price engine was used.

[*Since the symposium described above, the Auster A.O.P.9 has made its appearance. This machine, fully described on pages 761-765 of this issue, would prove eminently suitable for agricultural work, with appropriate modification from its A.O.P. function.—Ed.*]

AIRCRAFT SERVICING COURSES

A FIVE-YEAR part-time course in aircraft servicing and maintenance has been established by the City and Guilds of London Institute for the benefit of technicians in the Service or in industry. Its object is to supplement the student's employment experience and so to improve his knowledge and skill.

The course is arranged in two stages, intermediate and final, and the syllabus caters for specialization in either engines or airframes. The intermediate course lasts three years of part-time study and the final course two; courses will start at the beginning of the 1954-55 academic year. There will be annual examinations in both levels, the first being in 1955.

Full particulars can be obtained from the City and Guilds of London Institute, Department of Technology, 31, Brechin Place, London, S.W.7.

The advisory committee for the new course contains a number of eminent men in aeronautics: its chairman is Sir A. H. Roy Fedden; the secretary of the Royal Aeronautical Society and the technical secretary of the S.B.A.C. are ex-officio members; and other members include Messrs. R. L. Lickley, B. S. Shenstone, B. W. Barlow, R. Boorman, C. C. Ferguson, J. H. Spaull, R. J. Packman, G/C. W. T. Matthews and G/C. A. A. Saw.

CANADA'S NEW AERONAUTICAL BODY

C.A.I. Elects Council Members

THE accompanying photograph shows six of the seven members of the Council of the Canadian Aeronautical Institute who were elected at the Institute's first annual general meeting in Ottawa on May 25th. Two representatives come from each of the Ottawa, Montreal and Toronto branches, and G/C. H. R. Footit, previously chairman of the Interim Council, is an ex-officio member of the new council.

Following the general meeting, some 500 members and guests attended a dinner, after which Mr. J. A. D. McCurdy (Canada's first pilot) presented the McCurdy Trophy to Mr. R. S. Hiscocks of de Havillands for his work on the Beaver and Otter. Addressing the dinner, A.V-M. A. Ferrier outlined the development of the C.A.I. and its future objectives. Dr. A. M. Ballantyne (R.Ae.S.) and Mrs. Ballantyne, and Mr. B. S. Shenstone were among those present at the dinner, and congratulatory telegrams to the Institute were received from Sir Sydney Camm (R.Ae.S. president), Mr. J. L. Atwood (I.A.S. president) and Mr. G. H. Dowty.

The president of the C.A.I., Dr. J. J. Green, M.B.E, is at present Chief of Division "B," Defence Research Board, and is scientific adviser to the Chief of the Air Staff, R.C.A.F. He was previously chief research aeronautical engineer of the Air Transport Board. In 1948 he was elected a Fellow of the Royal Aeronautical Society, and in 1950 a Fellow of the Institute of the Aeronautical Sciences. He holds a valid commercial pilot's licence, and flew on test-pilot duties during his war service as chief research engineer at the R.C.A.F. Test and Development Establishment.

G/C. H. R. Foottit is at present responsible for R.C.A.F. aircraft and engine development, his past experience having been gained with the Heston, Fairey, Consolidated Vultee, and Ryan companies and in the R.C.A.F. Air Commodore G. G. Truscott, R.C.A.F. Chief of Development, commanded No. 404 R.C.A.F. Coastal Squadron based in the U.K. in 1942, later being appointed Director of Air Staff, Overseas Headquarters, London.

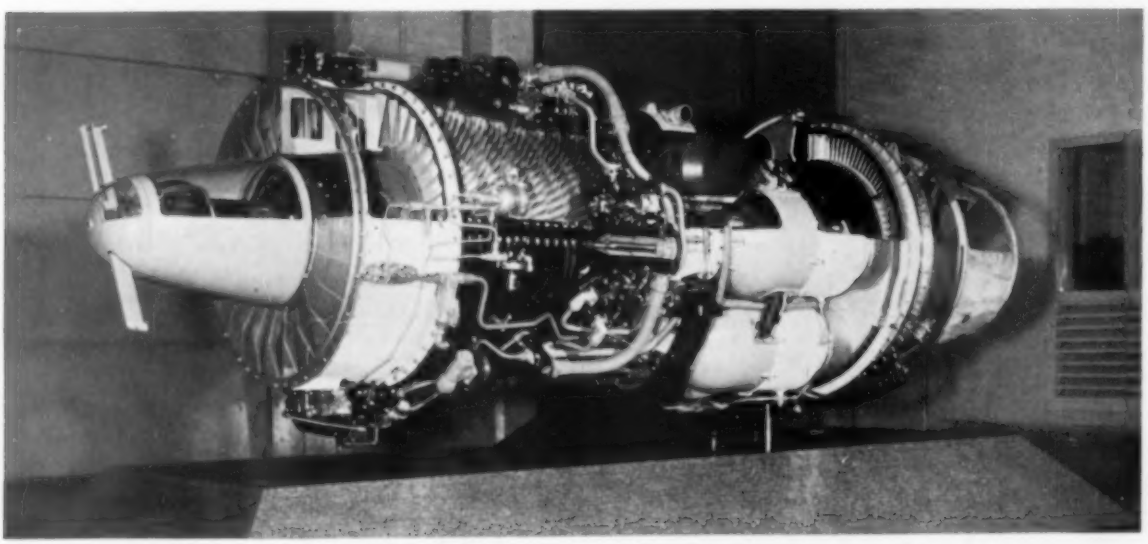
One of the Montreal Branch representatives, Mr. R. D. Richmond, is Canadair's chief development engineer and also vice-president of the C.A.I. He has previously worked with the National Research Council, Fairchild Aircraft and Canada Car and Foundry. Dr. G. N. Paterson, at present Director of the Institute of Aerophysics, University of Toronto, was previously engaged in aerodynamic work for the Council for Scientific and Industrial Research in Melbourne, Australia, and before that at R.A.E., Farnborough.

Council-members of the Canadian Aeronautical Institute. Standing, left to right, are Mr. H. C. Luttman (Toronto), Mr. G. Rosenthal (Montreal), A. Cdre. G. G. Truscott (Ottawa). Seated are G/C. H. R. Foottit, Dr. J. J. Green (Ottawa, President) and Mr. R. D. Richmond (Montreal, Vice-president). The seventh member is Dr. G. N. Patterson (Toronto).

The two remaining members of the Council are Mr. G. Rosenthal, of the aerodynamics section of Canadair, and Mr. H. C. Luttman, contracts administrator of A. V. Roe Canada, Ltd. Mr. Luttman, after working for Armstrong Whitworth, joined the aircraft inspection branch of the Air Ministry, and came to his present firm in 1947.

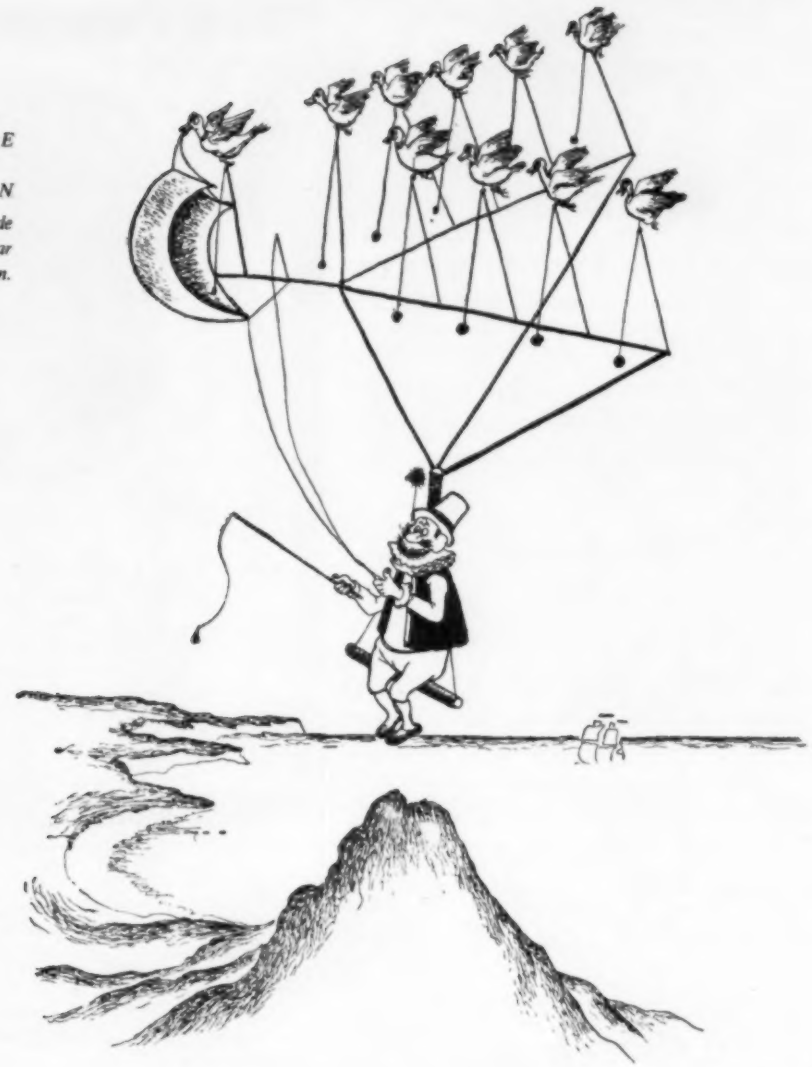
It may be recalled that the charter application for the Institute was forwarded to the Canadian Secretary of State on February 6th of this year. Close co-operation is being maintained between the new society and both the R.Ae.S. and the I.A.S. Five members of the Council were also members of the C.A.I. interim committee, a photograph of which appeared in our issue of April 30th.

ORENDA ON SHOW: AN IMPRESSIVE EXHIBITION-PIECE BY AVRO CANADA



This beautifully finished, part-sectioned Orenda turbojet, on view at recent exhibitions in Southern Ontario—including the Canadian International Trade Fair—has attracted a great deal of interest, especially from thousands who have never before seen a gas turbine. This particular unit is of the 6,500 lb-thrust type installed in the CF-100 Mk 4; it is an "all-weather" engine, and the rotary de-icer sprays can be seen on the spinner cone.

A page from
THE ESSO HISTOIRE OF AERIAL LOCOMOTION
Adapted from the French de P. Crochet-Damais. Illustrated par Philippe Féty avec permission.



WITH GONZALES TO THE MOON

DOMINGO GONZALES is the hero of a romance or comedy (according to taste) written by Frank Godwin, Bishop of Hereford, and published in London in 1638. Domingo was a remarkable man, a traveller of renown, an intrepid explorer and an inventor of no mean skill. And it was this skill that came to his rescue when unfavourable winds wrecked his ship and cast him upon the deserted island of St. Helena.

With characteristic and even traditional cunning (he knew all about the celebrated escape of Dædalus from the Labyrinth) he fashioned a flying carriage, a sort of mobile, drawn by a flock of tamed geese, or ganzas — goosy goosy ganzas. And on a calm night our hero took to the air from the volcanic peak of Teneriffe. His was a memorable flight. He soared to the empyrean and beyond, and finally touched down on the cratered surface of the moon.

Domingo Gonzales should be remembered not only as the inventor of the mobile but as a pioneer of lunar travel.

Today genius gets results by remembering that it pays to say

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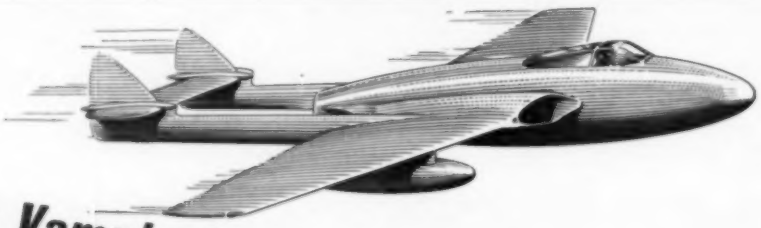
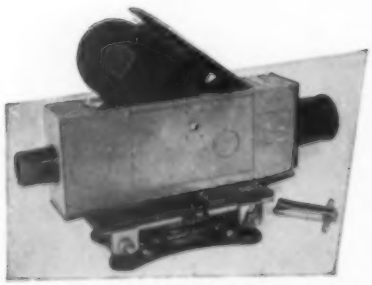
This dual engine temperature indicator, housed in a large S.A.E. case, comprises two Millivoltmeters with 100° scale angle, and is designed for use with copper/constantan, or chromel/alumel thermocouples.

Also supplied as a dual ratiometer indicator for use with resistance bulbs.



To match the Vampire's speed . . .



The G45 Camera Gun
Length 12¼", Width 3¾", Height 5"
Incorporated in the Vampire

Williamsons are effectively meeting the challenge of 1954's speeds and altitudes where air cameras are required. Redesigns are in production with twice the focal length of previous models incorporating an image compensator to prevent blurring.

WILLIAMSON

MANUFACTURING COMPANY LIMITED
Photographic Engineers
LITCHFIELD GARDENS, WILLESDEN GREEN, LONDON, N.W.10
In Canada: Williamson Company of Canada Ltd., Toronto, Canada.

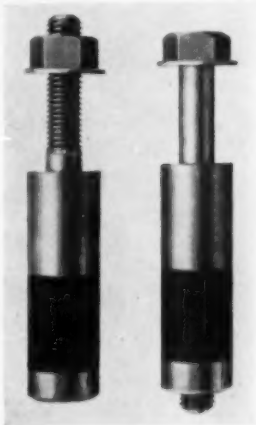
WH15

The Industry

NEW-ERA METAL: The factory of Canadian Steel Improvement, Ltd., at Etobicoke, North Toronto, the titanium-forging company acquired (as reported in "Flight" of April 23rd) by the Hawker Siddeley Group. They are shortly to extend the plant.

Resilient Floor-bolts

GAS-TURBINE test-beds, and silencing equipment associated with them, are among the varieties of plant in which increasing use is being made of "Seetru" mounting bolts. These bolts, the makers of which are L. H. Newton and Co., Ltd., Nechells, Birmingham, 7, combine the normal function of a holding-down bolt with that of providing a measure of resiliency that greatly reduces the risk of the bolt working loose in the foundation material under the effects of vibration. The principle of operation is a simple one in which a rubber sleeve is compressed axially between two faces, resulting in radial expansion of the rubber to afford a powerful, evenly distributed grip on the foundation material.



Two types of "Seetru" bolt.

Among the advantages claimed for "Seetru" bolts are simplified preparation of concrete beds. Instead of the bed being poured in stages, with halts for the setting-up of bolts, or of the leaving of large pockets to be subsequently grouted, it can be brought to finished level in one pouring. Holes are drilled or moulded to suit the bolt diameter, and the bolts can then be inserted and the equipment installed and tightened-down.

Of the two "Seetru" bolts shown here, the left-hand type is that usually employed for wall mountings, the projecting threaded portion affording location and support of the equipment before the nut is tightened. The other is the floor type, in which the large-diameter part of the assembly is first dropped into the hole, so that it is then possible to move the machine into register, with minimum lifting, before the bolt is dropped in and screwed home.

Airliner Galley Equipment

ILLUSTRATED here is the Stiebel Eltron hot-cup, one of the range of airline galley utensils and equipment marketed by Eltron (London), Ltd., Strathmore Road, Croydon, Surrey. The company's associates, Stiebel Eltron Werke, have developed this range in collaboration with K.L.M., and a number of airlines are using various items from it. The Model H.C. 1 hot-cup has a capacity of one litre (0.25 U.S. gal) and on 28v D.C. consumes 560W; its weight is 3 lb. The inner vessel is of tinned copper and the outer of chromium-plated brass, and it is stated that the cup may safely be completely immersed in water for cleaning. Other models are available, including a half-gallon size.

Eltron HC.1 hot-cup.

Further equipment in the Eltron range, full details of which can be obtained from the company, are a two-gallon hot-jug with thermostat control; an automatic coffee-maker; a three-litre (0.79 U.S. gal) thermostat-controlled water-heater; and a hot-cupboard, containing seven two-plate sliding shelves, for keeping meals at a temperature of 176 deg F.

A Croydon Appointment

APPOINTED overseas sales manager to Field Aircraft Services, Ltd., of Croydon, is Mr. H. St. G. Bond. Educated at Wellington College, "Bobby" Bond joined the Shell aviation department in London in 1937. He was commissioned in the R.A.F. in 1939 and flew No. 98 Sqn. Battles with the A.A.S.F. in France in 1940. Later he flew Hurricanes in the Battle of Britain, and was subsequently on Defiants with No. 151 (Fighter) Squadron. In 1943, as a squadron leader in No. 46 Sqn. in the Middle East, he destroyed two German seaplanes in night intruder operations over the Dodecanese Islands. He came back to the United Kingdom in 1944 as O.C. of an anti-aircraft co-operation unit. After the war Mr. Bond rejoined Shell, who posted him to the Middle East. In 1950 he returned to London, where he joined the Royal Auxiliary Air Force and became a flight commander in 600 (City of London) Sqn. In March of 1952 he joined Fields as their Overseas Sales Representative.

Mr. H. St. G. Bond.

IN BRIEF

Rolls-Royce, Ltd., consolidated net profit for 1953 was £3,590,771 (1952, £2,236,356); taxation absorbs £2,875,000 (£1,637,000). After the annual general meeting on July 7th approval will be sought for increasing the authorized capital to £10,000,000.

* * *

The R.F.D. Co., Ltd., whose annual general meeting was held on May 28th, report a 1953 trading profit of £108,586. Taxation will absorb £75,696.

* * *

The company formerly known as Aeroservices (London), Ltd., has modified its name to Aeroservices, Ltd. Croydon Airport, Surrey, remains the address.

* * *

"Weight control begins with material-selection—begin with specific gravity 1.8" is the theme of an instructive brochure on the characteristics of magnesium-zirconium alloys. Entitled *Weight Control with Elektron*, it is issued by Magnesium Elektron, Ltd., Clifton Junction, near Manchester.

* * *

From the Quasi-Arc Welding Co., Ltd., Bilston, Staffs, comes an illustrated brochure describing the company's research laboratories, which were formally opened recently. The new building contains eight main laboratories, which are primarily concerned with research into electrodes. Development of welding equipment is carried out in other laboratories.

* * *

After ten years' service with Rolls-Royce, Ltd., G/C. L. R. Stokes, D.F.C., has resigned in order to join the Board of Bowmaker (Plant), Ltd., Willenall, Staffs, as managing director. G/C. Stokes joined Rolls-Royce as a test pilot; he was subsequently posted to the sales department and in 1948 was appointed deputy to the sales manager.

* * *

World rights for Sira gearing—an Italian invention—have been secured by S. E. Opperman, Ltd., of Boreham Wood, Herts. Of this ingenious system, which enables exceptionally heavy loads to be transmitted through gears of normal width at closely pitched centres, we hope to give some details in the near future. Meanwhile, the gear is being demonstrated at the Mechanical Handling Exhibition, Olympia (Stand 05, 1st floor, National Hall).

CIVIL AVIATION

CAPITAL INVESTMENT: The Viscount as it will appear in the colours of Capital Airlines. This company's order for three Viscounts is discussed on page 750 and in the paragraph below.

CAPITAL'S VISCOUNT ORDER

WHEN the placing of Capital Airlines' order for Viscounts was announced, congratulatory messages were sent to Vickers-Armstrongs by Mr. R. A. Butler, Chancellor of the Exchequer, and by Mr. A. T. Lennox-Boyd, Minister of Transport and Civil Aviation. Sir James Reid Young, chairman of Vickers-Armstrongs, commented: "This is a very important event not only for us, but for the whole of the British aircraft industry. Naturally we are delighted that the Viscount will be the first British aircraft to be used on domestic airline routes in the United States, and we believe that Capital Airlines will be very satisfied with their new equipment."

Mr. J. H. Carmichael, president of Capital Airlines, said in reply that the company believed the Viscount to be the aircraft to have for future operations on their routes. They hoped to do extremely well with it and, on behalf of his team, he wished to make special mention of the happy personal relationships which had been formed during the negotiations. Mr. Carmichael, who signed the contract on behalf of Capital, also paid tribute to the co-operation of B.E.A. in supplying operational data on the Viscount.

More than 20 of "Slim" Carmichael's 47 years have been spent with Capital Airlines. He joined the company as a pilot, having learnt to fly in 1926. In the course of a very active flying career he has logged over 12,000 hours, many of them as the airline's chief pilot. Mr. Carmichael became president of Capital Airlines in 1947, having successively acted as operations manager, vice-president operations and executive vice-president.

In 1935 he was awarded the Airmail Flyer's Congressional Medal of Honour—the highest United States award that can be given to a civilian pilot for bravery. He was awarded the medal by Congress as a result of a flight with mail and with a number of passengers in a twin-engined machine, one engine of which caught fire. The burning engine fell out from the airframe; but, with the rest of the structure still ablaze, Carmichael—who was the sole pilot—was able by his example to keep the passengers calm while he brought the machine to a safe landing in Washington.

CHEAPER BY AIR

AN announcement from Redifon, Ltd., provides an interesting practical example of how, for certain specialized cargoes, air freight is not only the safest and quickest but the cheapest method of shipment. To control aircraft using Luxembourg Airport, the authorities there recently purchased from Redifon, Ltd., the necessary radio equipment to provide long and medium distance R/T. and broadcasting services. The equipment included two single-channel 2.5 kW and two single-channel ½ kW transmitters for speech transmission with remote control units for each. The frequency range covered is 2-23 mc/s.

Careful consideration was given to the method of transport to be employed; it was essential that the equipment be delivered without delay, and the speed of air transport ensured this beyond doubt. The nature of the goods meant careful handling in transit. Arrangements were therefore made for the company's vans to drive on to the tarmac and for the packaged equipment to be loaded straight into the aeroplane at London Airport. As the goods were for use at Luxembourg Airport itself, they were handled again only at unloading. Thus, despite the fragile nature of the cargo, no very elaborate or expensive packaging was necessary. The total weight of the consignment was 4,200 kg and its value £10,000.

The outstanding feature of the whole transportation, Redifon report, was the cost involved, which was less than would have been incurred by alternative means of transport. The aircraft, a Sabena DC-4 with a 7,500-kilos load capacity, left London Airport at 5.30 a.m. and flew *via* Brussels, arriving at 7.15 a.m.

COSTLY CARGO: £10,000 worth of Redifon radio equipment destined for use at Sandweiler Airport, Luxembourg, is loaded aboard a Sabena DC-4 at London Airport (see "Cheaper by Air" above).

SATISFIED: Mr. J. H. Carmichael registers approval from the left-hand seat of the prototype Viscount "Endeavour". As reported above, the youthful president of Capital Airlines has 12,000 hr piloting experience.

BEAM RIDER: Demonstrated publicly at the recent Staverton air display, this probe-equipped Dakota (G-AMZE) is owned by the Ministry of Supply and operated by Smiths Aircraft Instruments; its role is approach-and-landing research. "Flight" photograph

Leaving Brussels within half an hour it landed at Luxembourg at 9 a.m. Here the equipment was unloaded within 30 minutes.

NORTHERN RADAR

RADAR service on similar lines to that now provided in the south of England is now available to civil aircraft using airports in the Manchester/Liverpool area. Northern Radar, as the new service is called, went into operation on June 1st. The unit is situated at R.N.A.S. Stretton, some 14 miles west of Manchester and provides surveillance coverage of most of the Manchester Control Zone together with sections of the airways extending from the zones. Initially operating from 0745 hours to 1315 hours on each weekday, Northern Radar uses the same radio frequencies as the Manchester Control Zone and Preston Airways. Its primary function will be to avoid delays to peak summer traffic by reducing separation where necessary.

TWO MORE L.1049s FOR QANTAS

TWO of six Super Constellations originally ordered by Northwest Orient Airlines for trans-Pacific service between the United States and Japan are to be delivered instead to Qantas Empire Airways, increasing the latter company's fleet from eight to ten. Northwest, who will introduce their four Super Connies to service next Spring, say that the two aircraft were sold to Qantas in keeping with the company's programme "of maximum aircraft utilization and economy." As reported on another page Qantas have so far taken delivery of three of their new Lockheeds.

The deal may help to solve B.O.A.C.'s current equipment problem. When the Comets were first withdrawn from service the British airline negotiated with Qantas with a view to obtaining four of the latter's six Constellation 749s. Such an arrangement, however, would have had the disadvantage of leaving Qantas with two only of these aircraft—too small a number to integrate into the route pattern. Now that it has been found possible to acquire extra Super Constellations, Qantas will probably make over all six Model 749s to B.O.A.C. It was originally intended that these aircraft should be sold in the United States for dollars in order to help pay for the Model 1049Cs. It seems possible that, with the prestige of B.O.A.C. at stake, Britain may have helped Australia to find the hard currency—totalling about $23m—required to buy ten Super Constellations.

NEW FERRY SERVICES

ON June 1st Silver City Airways opened their new cross-Channel route between Lympne and Marck, Calais. The company reports that more than 6,000 flights are scheduled to be made between the two points by mid-October, and that a Freighter or Super Freighter will land or take-off from either airport every seven minutes of each working day. Over the same period 8,500 flights will be made on the Le Touquet ferry. Fares on the new Calais route are the lowest ever offered by Silver City: the cheapest single fare for a car (£6 1s 6d for a Morris Minor) is 20 per cent less than last year's Lympne-Le Touquet rate for a vehicle of this length. A bicycle can be flown to Calais for as little as 4s 6d and a motor cycle for 27s. The company points out that passengers without vehicles can, by using train services from London to Lympne and from Calais to Paris, complete the inter-city journey in an elapsed time of six to seven hours for about £8 return—which is claimed to be £4 cheaper than normal scheduled air services between London and Paris.

BRITISH TRAFFIC IN FEBRUARY

FEBRUARY traffic statistics issued by the M.T.C.A. reflect the effects of the grounding of B.O.A.C.'s Comets. The capacity available on the Corporation's eastern routes fell by 13 per cent and traffic carried fell by 10 per cent; however, there was a 13 per cent increase in traffic on western routes, and the overall traffic carried by the Corporation, compared with the amount for the corresponding period of 1953, was only 3 per cent lower.

Both capacity offered and traffic carried on B.E.A.'s routes increased by the same proportion—14 per cent. Most of the scheduled services operated by British independent airlines are comparatively new and the traffic figures suggest that some of these companies are passing through a lean period. Independents offered 48 per cent more capacity on domestic services, but their total traffic on these routes rose by only 8 per cent. On international services independents offered 2 per cent more capacity and carried 26 per cent less traffic. Their overall load factor dropped from 42 per cent to 30 per cent on domestic services and from 62 per cent to 49 per cent on international services.

AFRICAN ACCIDENT REPERCUSSIONS (Continued from page 751)

ance, which are not a matter of workshop process, the Board specifies in precise form the properties required of an aircraft and also details tests to be undertaken to prove them. It would appear, therefore, that in reaching this particular recommendation the Court had not the advantage of full knowledge of the relations of the Board to the industry.

"A number of the Board's requirements are statements of the object to be attained, and in respect of matters concerning basic engineering practices are written intentionally in terms which leave the method to the manufacturer. It would be highly dangerous and quite impracticable to issue mandatory instructions describing in detail the methods to be used in aircraft manufacture.

"To provide explicit instructions covering engineering practice would involve the publication of a complete range of textbooks; and might have serious consequences in preventing continuous improvement in a rapidly changing industry. All requirements have to be read in conjunction with the interpretation given in the introduction to them:—

> 'The Requirements with or without explanatory matter should not be regarded as constituting a textbook of current aeronautical knowledge; interpretation of the Requirements against a background of such knowledge is essential.'

"Without this background D.18 may well appear to be platitudinous, but it is a typical general requirement based on an assumption of adequate knowledge on the part of the constructor of basic workshop practices such as the protection of primary structures. A constructor would not be 'approved' unless the Board were satisfied that the practices followed attained a proper standard in this respect.

"The Court also referred to the 'apparent self-complacency on the part of the Board.' This comes as a surprise if only because the Board expressed no opinions. It is true that a specialist surveyor was present and Crown Counsel called him to speak on particular points, but beyond this the Board took no part. Far from being complacent the Board feels that it is in a constant state of change and development in attempting to keep abreast of an industry which is itself developing with extreme rapidity. The Board has to try to maintain airworthiness, sometimes in uncharted fields of knowledge, but it has also to maintain to the utmost the freedom in which lies the surest hope of improved efficiency and, with efficiency, safety.

"The system of delegating to manufacturers the responsibility for the fulfilment of airworthiness requirements, both specific and general, which the Court considers should cease is, in fact, the only possible method whereby an authority such as the Board could fulfil its functions. The system involves making spot checks during the design and manufacturing stages of a large variety of features. To go further than this and check every detailed phase in the manufacture of every aircraft would be quite impracticable.

"The principle of delegation followed by the Board is also followed by Government departments in the United Kingdom in relation to military aircraft and by comparable airworthiness authorities in other countries."

Criticisms of the S.B.A.C. were answered by that Society in the following terms:—

"Sir John Gray's reported criticisms of the Society of British Aircraft Constructors are based on incomplete information and misunderstanding of the role of the S.B.A.C. in regard to the airworthiness of civil aircraft. The chart in question, which the report states was never produced, was prepared by the Society to help aircraft constructors to comply with Government requirements for protection against corrosion of metal parts of Service aircraft. Contrary to what the report says, this chart was completed and circulated to the Members of the Society, and communicated to the Air Registration Board. Its purpose was to provide quick and convenient reference in chart form to Government requirements. It was not in itself a mandatory document. The S.B.A.C. does not control the airworthiness of civil aircraft, which is the function of the Air Registration Board."

In reply to a Commons question on June 4th, Mr. A. R. W. Lowe, Parliamentary Secretary, Ministry of Supply, confirmed that the original conclusion as to the cause of corrosion was taken from an R.A.E. technical memorandum compiled for purely departmental purposes and not written in contemplation of its being tendered in evidence.

DUTCH SCANDIA: First of a batch of six Saab Scandias built under licence by the Fokker factory; the attractive machine pictured here is one of two ordered by S.A.S. Four more Dutch-built Scandias will go to V.A.S.P., Brazil.

CIVIL AVIATION . . .

A COMET ACCIDENT: B.A.L.P.A. STATEMENT

IT will be recalled that on October 26th, 1952, B.O.A.C. Comet G-ALYZ was damaged beyond repair in a take-off accident at Ciampino Airport, Rome. Following an inquiry by the Accidents Investigation Branch of the Ministry of Civil Aviation, an official report was published expressing the opinion that the cause of the accident was "an error of judgment by the captain in not appreciating the excessive nose-up attitude of the aircraft during the take-off." Subsequently B.O.A.C. announced that Capt. R. E. H. Foote, who was in command of G-ALYZ at the time of the accident, had been transferred from Comets to York freighters.

The following statement on the accident was issued by the British Air Line Pilots Association early last week:—

In January of this year the Association requested the Minister of Transport and Civil Aviation to reopen the inquiry which the Accident Investigation Department had conducted into the accident involving Comet G-ALYZ at Rome in October 1952.

The Association made this request because, in its view, in the light of information and new evidence which had become available since that accident, the opinion expressed in the report of the Chief Inspector of Accidents that the accident was due to an error of judgment by the captain, did less than justice to Captain Foote, the pilot of the aircraft.

The Chief Inspector of Accidents has now informed the Association that, as a result of his re-examination of the circumstances, he can see no reason why he should change his opinion.

The Association finds it difficult to understand how he can reach this conclusion after having considered the information submitted to him. These are the main additional facts (none of which, if known, was referred to in the accident report), which in the opinion of the Association must cause any investigating officer at least to modify or qualify, if not completely to change, his opinion that "the accident was due to an error of judgment by the captain":—

(1) The pilot's Training Notes in use at the time said, with regard to the take-off margin, "For the Comet this margin is 15 per cent and so the safety speed, at which 'unstick' is made, is done at an air speed equal to 1.15 times the stalling speed." This margin of 15 per cent was not reflected in the speeds scheduled in the Company Operations Manual at the time of the accident. The "unstick" speed for the weight in question was scheduled at 112 knots, while the power-off stall scheduled in the Flight Manual was 102 knots, a clear indication that the margin was of the order of 10 per cent and not 15 per cent as presented to the pilot in his Training Notes.

(2) Tests on the Comet carried out after the second take-off accident (March 3rd, 1953) revealed a phenomenon believed to be new in the study of aerodynamics: when on or near the ground, the Comet was found to have an appreciably higher stalling speed than it had in free air. The increase was found to be proportional to weight. At the weight of the aircraft at the time of the accident (45,527 kg), the stalling speed (on or near the ground) was found to be about 9 knots higher than that assumed at the time.

In connection with the margins for take-off safety speed, the Association understands that the usual practice for piston-engined aircraft is to require a minimum margin of 15 per cent above the power-off stall, thus (at the speeds considered) providing the pilot with a take-off margin of some 22 to 25 knots above the power-on stall.

However, the effect of the 9-knot error in stalling speed was to reduce the pilot's margin above the power-on stall from an assumed figure of 16 knots to 7 knots and his margin above the power-off stall from 12 knots to 3 knots.

(3) Since the accident, B.O.A.C. has twice changed the take-off technique and has increased the "unstick" speeds by 6 knots.

It will be recalled that in May 1947 the Association had occasion to comment adversely on two accident reports produced by the Accident Investigation Department of the then M.C.A. Consequent upon the comments of the Association, the Newton Committee was set up and, as a result of its recommendations, the accident investigation procedure was changed. The whole of the recommendations of the Newton Committee were, however, not accepted.

This particular case again raises the issue of whether some body divorced from the M.T.C.A. should not be responsible ultimately for accident investigation. The request of the Association on Captain Foote's behalf constituted very largely an appeal against a decision of the M.T.C.A. Accident Investigation Department itself which conducted the appeal. Its members should not be placed in the position of being judge and jury in their own case.

SEVEN-LEAGUE TANKS: Bulges over the engine nacelles of this Douglas DC-7 identify it as the development aircraft incorporating features of the new "overwater" DC-7B. These bulges house saddle tanks which increase the total fuel capacity from 5,512 to 6,400 (U.S.) gallons.

BREVITIES

TWO of the redundant B.E.A. Vikings now stored at London Airport have been sold to Misrair, and are being withdrawn from their protective Cocoons and prepared for service.

* * *

A wartime Battle of Britain pilot and post-war flight commander of No. 600 (City of London) Squadron, Mr. H. St. G. Bond has been appointed overseas sales manager of Field Aircraft Services, Ltd. Mr. Bond has been with the company since March 1952 as overseas sales representative.

* * *

Flying time on the Dublin-Paris service of Aer Lingus was reduced from 3 hr 15 min to 2 hr 5 min on May 29th, when the Viscount took over from the DC-3. The new turboprop aircraft operate five round trips weekly between Dublin and Paris (six from June 20th).

* * *

Canada has become the 21st state to sign the Rome Convention of 1952, which specifies the rules and the limits of liability in the case of an aircraft causing death or personal injury or damage to property in foreign territory. Five more states have yet to ratify the convention before it takes effect.

* * *

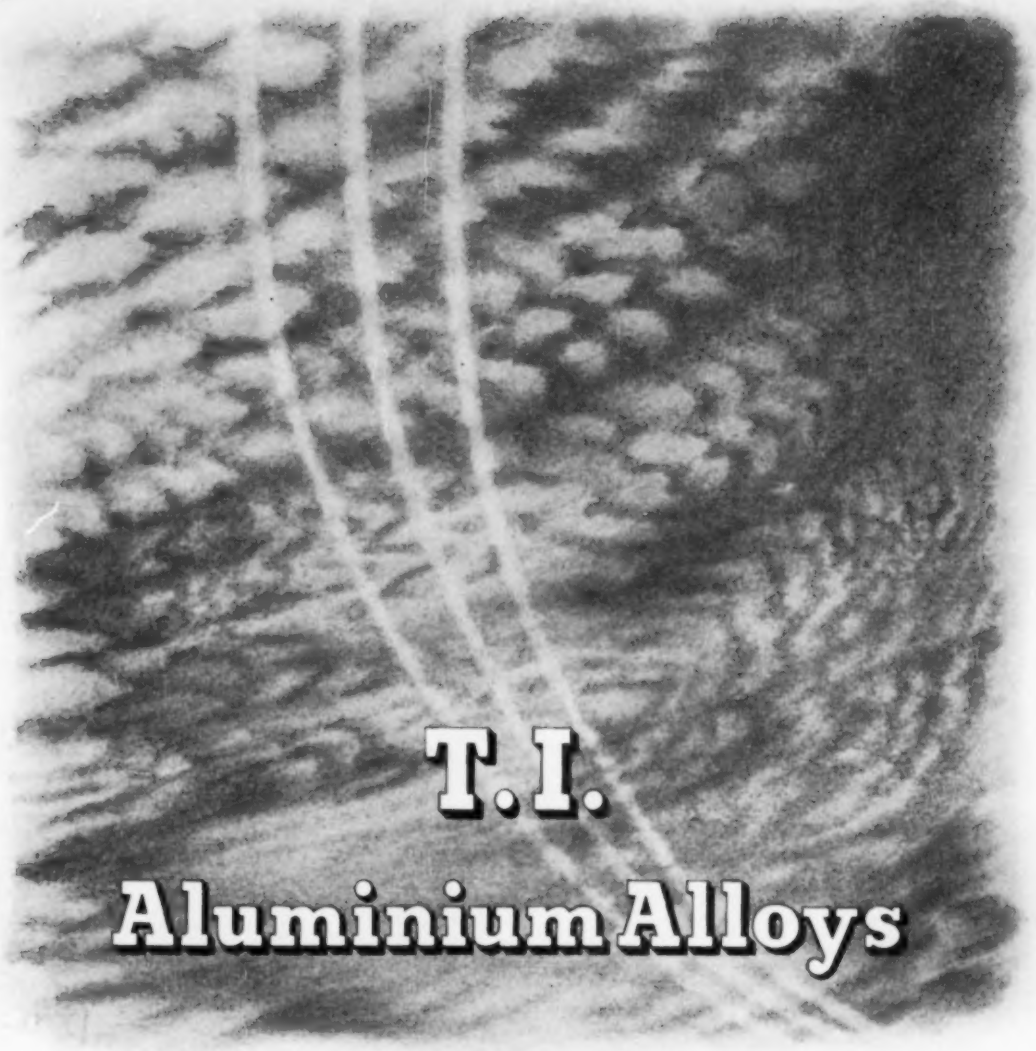
The Council of the Air Registration Board announces the issue of the following *Notices to Licensed Aircraft Engineers and to Owners of Civil Aircraft*: No. 7, Issue 17 (particulars of B.C.A.R. sections and sub-sections issued) and No. 42, Issue 2 (tailplane attachments in Taylorcraft Plus D, Auster 3, 4 and 5 variants, and J series aircraft).

* * *

The third of eight Super Constellations ordered by Qantas Empire Airways arrived in Sydney from California on May 24th. Among those on board the aircraft was Dr. Hall L. Hibbard, Lockheed's chief engineer and vice president, who is spending two weeks conferring with Qantas executives during the course of a world tour.

* * *

It is announced that Sir Donald Anderson, deputy chairman and managing director of the Peninsular and Oriental Steam Navigation Co., and Sir Edward Wilshaw, governor of Cable and Wireless (Holding), Ltd., have joined the Board of Britavia, Ltd., the British airline group which controls Silver City Airways, Ltd., and Aquila Airways, Ltd. Sir Donald's name, incidentally, was incorrectly quoted in the article dealing with Aquila Airways which appeared on page 732 of *Flight* for June 4th.



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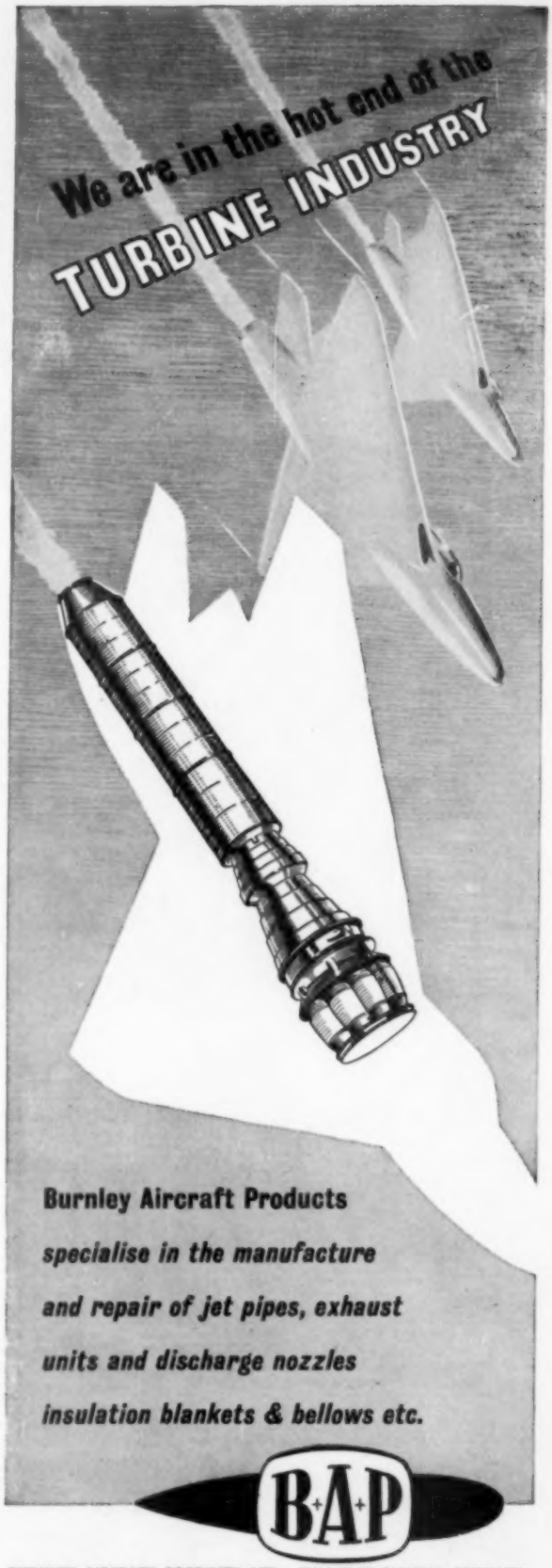
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SERVICE AVIATION

Royal Air Force and Fleet Air Arm News

Birthday Honours

ON the occasion of the Queen's Birthday, Her Majesty has been graciously pleased to approve the following honours and awards to officers and men of the Royal Air Force:—

ORDER OF THE BATH

Knights Commander.—Air Marshal Sir John Nelson Boothman, K.B.E., C.B., D.F.C., A.F.C.; Air Marshal W. L. Dawson, C.B., C.B.E., D.S.O.

Companions.—A.V-M. H. H. Brookes, C.B.E., D.F.C.; A.V-M. J. G. Franks, C.B.E.; Act. A.V-M. P. D. Cracroft, A.F.C.; A.Cdre. R. Coats, M.A.; A.Cdre. K. B. B. Cross, C.B.E., D.S.O., D.F.C.; A.Cdre. D. G. Morris, C.B.E., D.S.O., D.F.C.; A.Cdre. E. L. S. Ward, D.F.C.; G/C. F. J. Manning, C.B.E.

ORDER OF THE BRITISH EMPIRE (Mil. Div.)

Knight Grand Cross.—Air Chief Marshal Sir John Whitworth Jones, K.C.B., C.B.E. (retd.).

Knights Commander.—Air Marshal L. F. Pendred, C.B., M.B.E., D.F.C.; Act. Air Marshal G. E. Gibbs, C.I.E., C.B.E., M.C.

Commanders.—Act. A.Cdre. M. D. Ommanney; G/C. J. R. A. Embling, D.S.O.; G/C. W. F. Lamb, O.B.E.; G/C. C. V. Mears; G/C. P. T. Philpott, O.B.E.; G/C. C. F. G. Rogers, O.B.E.; G/C. A. A. Saw; G/C. E. A. Whiteley, D.F.C.; G/C. A. W. Younghusband (retd.).

Officers.—W/C. T. Bradley; W/C. R. D. Elliott, D.F.C.; W/C. E. J. Harrington, B.Sc., A.R.C.S., D.I.C.; W/C. I. G. S. Hemming; W/C. W. I. C. Innes; W/C. D. S. Lindsay, D.F.C.; W/C. A. J. Payn, M.B.E.; W/C. J. F. Roberts; Act. G/C. J. B. Russell, D.S.O.; W/C. D. R. Stubbs, D.S.O., D.F.C.; W/C. C. E. Thurston; Act. W/C. F. Herbert, B.Sc., A.M.I.C.E.; Act. W/C. M. G. Pearson; S/L. D. H. Beckett; S/L. J. A. Brignell, D.F.C.; S/L. R. A. N. McCready; S/L. R. H. Stephenson.

(To be continued)

New C-in-C. Far East

THE Queen has approved the appointment of A.V-M. F. J. Fressanges, C.B., as Commander-in-Chief Far East Air Force, in succession to Air Marshal Sir Clifford Sanderson, who is retiring from the R.A.F. A.V-M. Fressanges will take up his new post next November, with the acting rank of air marshal.

Since May 1952, A.V-M. Fressanges has been Assistant C.A.S. (Intelligence) and before that was A.O.C. Aden. At the outbreak of war he was commanding No. 210 (Flying-boat) Squadron and later was attached to the United States Atlantic Fleet as adviser on anti-submarine warfare. From 1944 to 1946 he was A.O.C. No. 47 Group, Transport Command—the Group which was responsible for carrying the British members, including the Prime Minister, to the conferences at Casablanca, Cairo, Teheran and Yalta.

OFF THE LINE: A new view of the first production Vickers-Armstrongs Valiant B.1 (four Rolls-Royce Avon RA.14s), showing the under-wing tanks. Several production B.1s are now in being, but no order for the B.2, which flew at last year's S.B.A.C. Display, has been announced.

NATO Channel Exercise

THE major NATO maritime exercise in the Channel Command (English Channel and Southern North Sea) of 1954 will take place between July 16th and 25th. It will be jointly directed by the Allied Commander-in-Chief Channel, Admiral Sir John Edelsten, G.C.B., G.C.V.O., C.B.E., and the Allied Maritime Air Commander-in-Chief Channel, Air Marshal Sir John Boothman.

Naval forces taking part will include minesweepers, escorts, fast patrol boats, submarines and auxiliary craft from Belgium, France, the Netherlands, Norway and the United Kingdom, together with United Kingdom maritime aircraft.

The exercise, known as Haul, will be held in conjunction with Exercise Dividend, the major air defence of Great Britain exercise, and with Exercise Winch, in which a United Kingdom Beach Brigade will be exercising the landing of stores on the Belgian beaches.

The aim of Haul will be to exercise the forces of the Channel Command in their wartime rôles, including minesweeping and anti-submarine and anti-E-boat warfare. Emphasis will be laid on exercising the liaison between the NATO maritime authorities and the national air defence forces concerned with the fighter defence of shipping.

Royal Fly-past

TOMORROW, June 12th, as part of the celebrations of the golden jubilee of the Royal Naval Volunteer Reserve, 96 aircraft drawn from the five air divisions of the R.N.V.R. will pass over the Horse Guards Parade in salute to the Queen, who is reviewing the R.N.V.R.

The flypast, which is timed to take place shortly after 3 p.m., will be led by Cdr. R. I. Gilchrist, M.B.E., who commands the Northern Air Division. It will comprise 48 Sea Furies from Nos. 1831, 1832, 1833, 1834, 1835 and 1836 Squadrons, and an equal number of Fireflies from Nos. 1830, 1840, 1841, 1842, 1843 and 1844 Squadrons.

Anti-Aircraft Ships

THE first of the 22 anti-aircraft frigates under construction at the beginning of the financial year in the Navy estimates is due to be launched this month from the Scott shipyards at Greenock.

BIRTHDAY HONOUR RECIPIENTS: (Left to right) Air Chief Marshal Sir John Whitworth Jones—G.B.E.; Air Marshal Sir John Nelson Boothman—K.C.B.; Air Marshal G. E. Gibbs—K.B.E.; and Air Marshal L. F. Pendred—K.B.E.

SERVICE AVIATION . . .

THE TENTH ANNIVERSARY

Recollections of the Part Played by the Royal Air Force in the Invasion of Europe

SUNDAY last, June 6th, was the 10th anniversary of the successful invasion of Europe and it is timely to recall the part played by the R.A.F. in "Operation Neptune," as the landing part of "Overlord" was code-named.

For the Air Command there were four main tasks: the provision of an air umbrella over the actual landings; the mounting of spoof raids to divert the enemy's attention from the selected beaches; the bombing of coastal batteries; and the dropping of airborne troops. D-Day was the culminating point of many weeks of interdiction and softening-up.

The diversionary operations were on a very large scale, a specialist force of no fewer than 105 aircraft and 36 Naval vessels being allocated to the task.

One of the most important of these spoof operations—"Taxable"—was largely conducted by No. 617 (the "Dam Busters") Squadron; it was no less than the simulation of a large "ghost" convoy of ships moving across the narrowest part of the Channel. Eighteen ships steamed at seven knots towards Cap d'Antifer and, to transform the radar response caused by these vessels into one indicating a large convoy, the Lancasters of No. 617 flew over the ships in a continuous wide orbit, gradually nearing the French coast. Every four seconds throughout the three-and-a-half hours of the operation, bundles of "Window" (the code-name for metal-foil strips which produced a false echo on the enemy radar screens) were thrown out of the aircraft to create the impression of a large convoy. This false picture was heightened by the ships towing balloons to create a large-ship type of radar echo. Meticulous timing was necessary, as an error of four seconds would have been sufficient to make the "convoy" look suspect. As the last Lancaster turned for home, German coastal guns opened radar-predicted fire on the non-existent convoy.

Recalling "Taxable," F/L. K. J. Ryall, D.F.C., writes: "Several weeks before D-Day No. 617 Squadron visited a radar station on the Yorkshire coast, where we were shown how coastal radar worked. Then we put in a spell of intensive training over the sea to perfect the special flying pattern required for our operations. I was flight-engineer leader of the squadron, but for "Taxable" I acted as one of the "Window" droppers. Three of us looked after the "Window" in each aircraft. The bomb-aimer timing with a stop watch, raised his hand every four seconds as a signal for us to push the stuff out, while another engineer and myself did the actual dropping. We took turns to do half of each circle over the convoy beneath. We worked on all fours, pushing the "Window" out of the photo-flash chute."

A similar deception was practised by No. 218 Squadron and another 16 ships heading for Boulogne. In the meantime 20 Lancasters of No. 199 Squadron patrolled the Channel, jamming enemy radar stations, while others flew patrols designed to lure enemy fighters from the landing areas. In fact the bulk of the German night-fighter force was ordered to intercept these aircraft.

Another spoof operation was "Titanic," in which three squadrons of Halifaxes and Stirlings simulated the approach of an airborne landing, "Window" giving an impression of a landing 20 times its size.

Fighter Command and 2nd T.A.F. provided the air cover and spotted for the Naval guns. The following eye-witness account is from S/L. R. H. G. Weighill, D.F.C., who was then a flight commander with No. 2 Squadron: "I was detailed," he says, "to lead the first pair of Mustangs from Gatwick, and dawn was breaking as we flew across the Channel. We could pick out the convoys, all heading in the one direction, and established contact with the cruiser *Black Prince*. We soon neutralized our first target, a large concrete gun emplacement, and flew inland to find further targets. We selected a concentration of enemy armour, and while this was being destroyed I was instructed to abandon the shoot and go down to 500ft and report on the progress of the landings. At that moment the barges were about 500 yards from the beaches, and were obviously racing each other to get there first. As they got nearer and nearer the excitement was tremendous. It was one of the greatest moments of my life when I reported to *Black Prince* that the invasion of Europe had begun. In all the excitement I had not realized that I was getting short of fuel, and as I turned for home my thoughts were with those magnificent army chaps for whom there was no easy way back. They had literally burned their boats, and were fighting for their lives to gain that foothold which was to mean so much."

Curiously enough, in three patrols flown that day over the back areas of the beach-heads by a Spitfire wing led by W/C. D. G. Smallwood, D.S.O., M.B.E., D.F.C., only one enemy aircraft was seen —a Ju 88, which was promptly shot down in flames. Three trains were attacked.

Silencing the German Guns

S/L. E. L. D. Drake, D.F.C., A.F.C., of No. 105 Squadron, contributes a Bomber Command memory of that vital day. "As far as most members of No. 105 Squadron were concerned," he says, "we did not know officially that the invasion had started until we returned to base after completing our sorties. No. 105 was a Pathfinder unit of Mosquitoes using 'Oboe,' the radar blind-marking and bombing device. My navigator and I suspected from the steadily increasing tempo of activity—and refusal of permission to leave camp—that D-Day must be imminent, although the form of briefing on the night of June 5th did not differ from any normal occasion.

"Our target was a German gun emplacement at Merville, on the coast of Northern France. We took off from Bourn, near Cambridge, early on June 6th and were soon over the target. The aircraft was flown on an accurate course, guided by signals from the control station in England for the final ten-minute level run-in to the target. At the prescribed moment the navigator received a release signal from the controller in England and dropped the markers. Due to cloud beneath us, we saw nothing of the target, nor any signs of the attack by the heavy bombers following behind. This was not unusual for a blind-bombing attack, but during the return to base in the early light of the morning we could see the mass of sea and air movements leaving our coasts. We heard soon after landing that Bomber Command's attack had been successful." In all, 1,136 bombers dropped 5,260 tons of bombs on ten coastal batteries.

The task of transporting the British 6th Airborne Division to the dropping zones north-east of Caen entailed the employment of 264 aircraft and 96 aircraft and glider combinations. These were drawn from Nos. 38 and 46 Groups and, like the bombers, saw the invasion ships ploughing their way across the Channel. From S/L. T. R. N. Wheatley-Smith of No. 48 Squadron, comes the following description: "Our Dakotas were to drop paratroops near the river Orne, about one minute's flying from the French coast. We took off at 11.30 p.m. As well as our 20 paratroops, we carried motor cycles slung under the fuselage and small bombs to be dropped over the enemy coast, just to keep the defences pre-occupied—surely one of the very few occasions when the old Dak has acted as a bomber. We flew in a stream, in vics or three and, with cloud obscuring the moonlight, formation keeping was a tricky task.

"There was no opposition over the coast, though we did see some flak towards Le Harve. Finding the dropping zone was difficult, owing to the short run-in and the diffused moonlight. There was no time for second runs as everything was timed to the second and we had to return at set heights to avoid interference with other aircraft. Coming back we could see the wakes of the invasion vessels ploughing across the Channel.

"On reaching the English coast we all switched on navigation lights, presenting a remarkable sight. Red, green and white lights were all around us, serving as a sharp reminder of the risk which existed due to the large number of aircraft operating."

Coastal Command's share in the complicated task was to prevent U-boats and enemy surface vessels from attacking the convoys. On the first two days the Command flew no fewer than 353 sorties. Describing the invasion as seen by the commanding officer of a Beaufighter unit, W/C. E. H. McHardy, D.S.O., A.F.C., of No. 143 Squadron, says: "A short time before the invasion we moved from North Coates, Lincolnshire, to Manston, Kent. We painted black and white stripes on our aircraft, and this, in addition to glimpses of the build-up of shipping on our coasts, was a fair indication that something was about to happen.

"Assisted by our radar stations, we operated every night against enemy vessels venturing out from Continental ports. Once we had been directed to the target it was comparatively easy to pick up the white wake of the E-boats, even in the dark. On the night of June 6th we were extremely active off the French coast, mounting between 18 and 26 sorties. The E-boats were out in force. An entry in my log-book describes a sortie under the control of G.C.I. station operating in the Le Touquet area, and an attack on three E-boats, during which one was sunk."

CORRESPONDENCE

The Editor of "Flight" does not hold himself responsible for the views expressed by correspondents in these columns; the names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

Air-display Absentees

AS one of the many thousands who attended the first Naval air day of the year, at Yeovilton, I was particularly interested in the coverage given to the event in the May 28th issue of *Flight*.

In view of the interest you showed in the event, I am sure you will also be interested in hearing from a member of the general public who negotiated appalling weather conditions in order to see what the Fleet Air Arm and Ministry of Supply does with our money.

After staying-out the show under the usual air-day conditions I now have a good idea what the Navy does with my tax money; but, due to the non-appearance of the Britannia, Vulcan, Swift and Hunter (at the "behest" of the Ministry of Supply) I am left somewhat in the dark as regards the considerable bequest I make each week to the furtherance of Britain's advance in the air.

In the case of the Britannia and Vulcan, which exist more or less in the singular, it is perhaps understandable that neither could turn up (interference with test programme, etc.), but as regards the Swift and Hunter—which by now can be probably counted in tens—surely it would have been possible to send one example of each for the public edification?

It is pointed out that few people in this area of the country have the opportunity to see current developments and that such incidents as these (due, it seems, to reluctance on the part of the M.o.S.) are not calculated to heighten interest.

A friend of mine heard two Naval officers remark that in view of the cancellations they thought it most unfair on the public, who had to pay to get in. I am inclined to agree.

I would like to add that I am prepared to put up with the weather, but not with the biggest wet blanket possible—provided with the kind permission of the Ministry of Supply.

Westbury-on-Trym, Bristol. P. H. DOBBS.

Imperial Blow-up

IN *Flight* of April 30th a correspondent was inquiring into the fate of the famous Handley Page Hannibals during the last war.

At the outbreak of war the whole of Imperial Airways fleet were held at the disposal of the Air Ministry and were used, in particular, to fly stores and equipment to vital bases in France. The Hannibals, the Ensigns and the flying-boats met with many adventures, and those concerned could recount exciting stories.

Of the Hannibals I recall the time when only two were left and these came to grief together on the aerodrome at Whitchurch (Bristol). It was blowing hard and the wind increased to something like a hurricane. One of our old engineers, who knew how vulnerable they were, went out to keep an eye on them, because, although they were tethered down, they were showing signs of breaking away. The engineer climbed aboard one of them and got the engines running, with the idea that if the wind blew the aircraft backwards he would counter with the engines. But the wind blew more strongly and with more effect than he had bargained for. It began to lift the 'plane. It was helped by the engines. Up shot the great Hannibal to twenty feet. Tied to the ground, it did not quite get clear and fly away, but hung there, engines roaring, engineer at the throttles trying from what he knew of their effect to get the beast back to earth again. There he sat in the pilot's seat, stolid and grand and apparently undismayed.

Several of us came on the scene during this unequal combat and, although we were helpless, aware of impending disaster and alarmed for the engineer's safety, I will confess that we were vastly amused at the situation.

Finally, the 'plane was blown backwards, and so was the other, and they both gradually wrecked themselves. Such was the end of the Hannibals—aircraft which in the early 'thirties I was flying in their heyday.

Sanderstead, Surrey. W. ARMSTRONG.

Wasted Material

NOW that the final closing-down of the R.A.F.V.R. flying schools has been completed, and the form in which the few survivors will receive their training revealed, I should like to say what I feel this means to the many younger cadet-pilots who obtained their initial training through an A.T.C. Flying Scholarship.

This scheme was started, I believe, with the idea of enticing aircrew recruits to join as regulars, and although I do not know how well it has succeeded, the idea itself was very good.

Most of the cadets who qualified for these awards were about to be called up in the near future. The ones who joined the V.R., therefore, had probably received deferment while they were furthering their education. To these, the V.R. was the only way in which they could maintain their licences and prepare for the time when their call-up became imminent.

Now, it seems we are to receive no further training whatsoever. This will not worry university students, who can transfer to their air squadrons, but a great many of us are taking the National Certificate as apprentices, and are not so fortunate.

I suppose the waste of money due to the loss of our training is not very great compared with that of the fully trained pilots and instructors who were also dismissed, but most of those had served in the Air Force already; it is we who will be required in a future war, and there must have been a great loss of enthusiasm when it was realized we were no longer wanted. Now, in spite of all the bright promises that have been made about the wonderful careers open to us in the R.A.F., I feel there will be suspicion that, if we did join, authority could get rid of us a second time just as rapidly as the first, and with no more arrangement for our future than was given to our instructors, whose value in the near future might be immeasurable.

With a little more preparation, surely an adequate scheme could have been found to keep in trim those who would promise to give serious consideration to the idea of joining the R.A.F. for short-service commissions when their education was complete. This could have taken the form of attachment to liaison squadrons, not necessarily for training but as a reserve, while providing for civil flying clubs to give sufficient flying for the maintenance of licences. After all, we should be capable of flying light spotting or ambulance planes in an emergency.

However, I fear this cannot possibly occur in time to be of most use to us, so that we shall have to stay grounded from now on; and no doubt our National Service will be just an unpleasant interlude in our lives.

What a pity that the official view of flying today seems to be that the only useful aircraft are those capable of exceeding the speed of sound, and that no pilot can possibly be of use unless lashed to an ejector seat.

Weybridge, Surrey. P. WARING.

Reminiscences

YOUR correspondent Mr. J. P. Herriot, of Derby, mentioned in his "memory tester" [Correspondence, *Flight*, May 7th] the Avro 504K as a four-passenger-seater. This is incorrect; the type he refers to was the Avro 536 of which a few were used up to the early 1930s for joy-riding.

I think I am right in stating that the 536 was 9in wider in the fuselage than the 504K and was powered with a 130 h.p. Clerget engine, although the engine intended for this type was the 140 h.p. Clerget or the B.R.1, neither of which was a success, owing to overheating.

London Airport. F. A. KENT.

[Since Mr. Herriot's letter appeared we have published (p. 682, May 21st) a photograph of an Avro 536. Sent in by Mr. C. Nepean Bishop, it showed the aircraft with pilot and four passengers.—Ed.]

AS one who was lucky enough to have flown Sopwith Pups and Camels in World War I, and who had a glorious ride in a two-seater Camel, I found Mr. J. P. Herriot's letter in *Flight* of May 7th most interesting.

When on Camels at South Carlton in 1918 we were visited by a glamorous fighter boy who tested us out individually in a two-seater. This happened at various Camel stations at a time when there was a certain amount of "wind up" over Camel casualties (mostly through spinning-in) and part of their job was to show that Camels need not bite when handled with confidence.

If not rigged dead true by Rigger Mortis, and then corrected quickly from a spin, they sometimes felt like going on round the other way. It was very important not to flap at such a moment, especially if under 2,000ft and remembering that one had no brolly!

We often practised fire action, this being a direct sideslip to port and starboard alternately, to carry flames away from the office until you got down among the earthly ones.

But what a glorious machine it was—so trigger-finger sensitive, although a pig to land in really gusty weather. Compared with some engines, the rotary ran like a sewing machine, but with big gusts of warm and (to me) perfect-smelling castor oil fumes giving memories of early Hendon aromas.

I just missed Dolphins, to my sorrow—a lovely, rakish looking machine with a rather French Spad look about it. The back

CORRESPONDENCE . . .

stagger looked menacing, and the fact that the office seat left one's neck in the region of the top plane leading-edge was most fascinating. They could take fire during pilot-jet adjustments for height.

As for the Salamander, I can remember only the French strafing (now referred to as ground-attack) version. Salamander pilots were comforted considerably by the provision of a bullet-proof seat.

Finally, one cannot recall old R.F.C. days without reference to the lighter side, such as silk stockings for scarves (I found one O.K. for summer and occasional winter use), with name and "love" inked in, and a gaily coloured garter round one's belt. They went along with fruit cake from the overall pocket, or chewing gum, according to taste—great "peppers-up"—and added sparkle to the cockpits of the glamour boys' chariots.

I was lucky again in World War II, as I passed into the A.T.A. as a ferry pilot for some years, flying over 40 types, as compared with four in War I. But I can never forget the Camel.

Esher, Surrey. JOYSTICK.

Getting into American Industry

I AM a Britisher with considerable working experience in the aircraft industry at home, and now employed in that field in America. I have found it extremely difficult to fight my way through all the red tape to get here and, when discussing with Americans the exasperating long-windedness of it all, hear it suggested that similar conditions obtain for Americans wishing to be employed in the British aircraft industry.

It would be interesting if any reader can outline the conditions under which Americans—or other aliens—can be employed in the British industry.

I came to America from Britain *via* Canada. The first step was to approach the American Consulate for an immigration visa. In my case this took more than five months to come through; the average is probably about four months. The information which I had to give on the application form was no more nor less than my life history—complete. Having filled in this document I had to wait about two months before being notified to go for a personal interview at the Consulate. This time-lapse appears to be about average for Montreal.

One of the conditions to be fulfilled by the applicant in order that a visa may be granted is that he must first have found employment in the States. This is a most arduous task because, with the American aircraft industry as it is, it is against the law for an employer to engage an alien (as we British are in America) on work of a military nature, unless the alien has been granted his security clearance. But this poses another problem, as the formalities for obtaining this clearance cannot be started until the alien is actually working with his new employer. Unfortunately, very few aircraft companies in the States are now willing to engage aliens under these conditions, as the procedure takes anything from six months up to about two years. During this period the employer must put his new employee on non-secret and unimportant work, which a junior could do. This state of affairs is naturally unsatisfactory to both parties.

In addition, in the great majority of manufacturing companies there seems to be an insistence on American citizenship as well. Citizenship, in any case, cannot be obtained until an alien has been resident in the U.S.A. for five years, which makes it extremely difficult to find a position, even outside the aircraft industry. Moreover, after having been five years or more in the States without becoming naturalized, it would jeopardize one's chances of continued employment. Feeling as I do, I would prefer to remain British.

U.S.A. BRITON IN AMERICA.

A Hollander Delves into History

WILL airmen old in the game search their memories for a moment and let me know if they ever saw that brave little Frenchman Adolphe Pégoud doing any outside looping in the happy days before world war one? By looping I mean flying the complete circle round, and not tracing a vertical S. Compiling data on aerobatics for an encyclopædia, I found stunt-flying history pretty confused so far as looping is concerned. In 1913 sundry papers published diagrams of Pégoud's feats which made us believe that he actually performed outside loops. So did *Flight* in its September 27th, 1913, issue, on information it got from Norbert Chereau, the Blériot representative in England. But after Pégoud had performed at Brooklands, *Flight* stated that a diagram showing the 'plane with the wheels towards the centre of the loop was wrong. In all experiments at Brooklands, Pégoud looped the loop with himself on the inside of the circle.

When the famous Jimmy Doolittle had made his over-sized outside loops with a fast Curtiss P.1-B pursuit (May or June 1927) the American monthly *U.S. Air Services* of July 1927 wrote, on the authority of an old timer, that their compatriot certainly was not the first to loop the loop that way—it was Pégoud. According to the American magazine, "Pégoud made nothing but outside loops back in the dark ages and in fact didn't know how to execute the normal inside loop." The unnamed old timer declared that he witnessed the feat several times.

I have consulted various aviation magazines of 1913 and, digging in my files, have come across cuttings dealing with Pégoud's somersaults, including the narratives published in the French daily papers *Le Matin*, *l'Auto* and the bi-weekly *l'Aéro* of December 12th, 1913, whose correspondents Mathieu, Guymont and Bruyère, were the first passengers to loop with the famous airman. But, save for the story of a fellow who was obviously looking with his eyes upside down (he witnessed "a tail-first *vrille* followed by a reverse loop") all talked about the fashionable way of looping—pulling the machine right up and over on to its back. Roger Mathieu of *Le Matin* recalls that during one of his loops, which was a short and fast one, his camera was heavy like lead, so that he hardly could raise it to his eyes. In the case of an outside loop Pégoud surely would have recommended his guest not to try taking pictures!

With regard to Pégoud's alleged outside looping, a question arises. Even if it might have been possible to pull a Blériot of 1912-13 vintage with 50 h.p. engine and two men in it the wrong way round, could the 'plane have stood the strain?

Bennebroek, Holland. HENRI HEGENER.

FORTHCOMING EVENTS

June 9-19. Mechanical Handling Exhibition and Convention, Olympia.
June 11-13. Royal Netherlands Aero Club: International air rally.
June 11-14. Palermo Aero Club: Sixth International air tour of Sicily.
June 12. Elstree Flying Club: "At Home."
June 13. Tangier Aero Club: Rally.
June 13. R.Ae.S. Garden Party, London Airport.
June 13-27. Polish Aero Club: International gliding competitions.
June 18-19. R.Ae.C.: National Air Races, Coventry Civic Aerodrome.
June 19. A.T.A. Association: A.G.M. and reunion, White Waltham.
June 19-20. Eighth air rally of the wines and chateaux of Anjou.
June 19-21. Aero Club of Savoie: Vermouth international rally, Chambéry, Savoie.
June 20. Northamptonshire Aero Club: "At Home."
June 20. Northern Heights Model Flying Club: Gala Day, Langley Airfield.
June 21-24. Institute of the Aeronautical Sciences: Annual summer meeting, Los Angeles.
June 24-25. Women's air rally, Deauville.
June 26. Plymouth Air Display Committee: Air display.
June 26-27. Aero-Club de Fleurs de l'Orne: Normandie Rally.
June 27. Aero Clubs of France and Marseilles: International speed contest, Marseilles.
June 29. Milan Aero Club: Milan Grand Prix.
July 3. R.N.A.S. Eglinton: Air Day.
July 3. R.N.A.S. Bramcote: Air Day.
July 3-5. R.Ae.C. members' Deauville Rally.
July 3-5. Swiss watch rally, Bienne, Switzerland.
July 9. College of Aeronautics Students' Society: Annual presentation ball, Cranfield.
July 10. R.N.A.S.: Lossiemouth Air Day.
July 10-11. International Radio Controlled Models Society: Annual contests, Birmingham.
July 18. Yorkshire Aeroplane Club: "At Home," Sherburn-in-Elmet.
July 20-Aug. 4. B.G.A.: World Gliding Contests, Gt. Hucklow.
July. 31 Ulster Flying Club: Newtonards rally.
Sept. 7-12. S.B.A.C. Farnborough display and exhibition.

IN BRIEF

A correspondent who has been closely concerned with veteran aircraft writes to point out that the 1913 Farman biplane in the Nash Collection—illustrated in *Flight* of May 21st—should not have been described as a "Horace" Farman. It is, in fact, a 1913 machine fitted with 130 h.p. Renault engine, and it was the personal property of M. Maurice Farman. The aircraft known to the R.F.C. as the "Horace" Farman came later; it was usually fitted with an eight-cylinder Renault and had a rather different outline.

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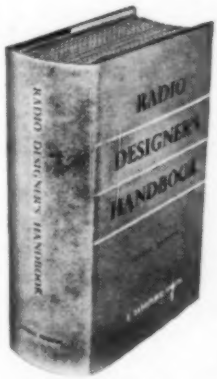

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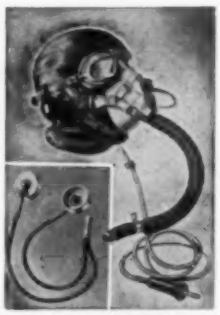

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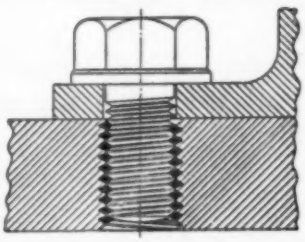

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THE Air Transport Advisory Council give notice that they have received the undermentioned applications to operate scheduled air services:—

APPLICATION No. 303 from Flightways, Ltd., of Southampton Airport, Eastleigh, Hants, for a seasonal normal scheduled service with Dakota and DH89 aircraft for the carriage of passengers, supplementary freight and mail between Southampton (Eastleigh) and Dinard (Pleurtuit) at an initial frequency of seven services weekly during the season from May to September inclusive for a 10-year period commencing from date of approval.

APPLICATION No. 304 from Airwork, Ltd., of 15 Chesterfield Street, London, W.1, for a colonial coach service with Dakota aircraft for the carriage of passengers and supplementary freight between London (Blackbushe) and Malta (Luqa), with intermediate technical stops at Lyons, Ajaccio and Tunis, at an initial frequency of two services weekly, increasing to one service daily, according to traffic demand, for a period of seven years commencing three months after date of approval.

APPLICATION No. 305 from British Overseas Airways Corporation, of Airways House, Great West Road, Brentford, Middlesex, for amendments to the normal scheduled services which they operate on the routes set out as Routes Nos. 2, 3, 4, 5 and 6 in Schedule "A," Part I, of the Terms of Reference issued to the Council by the Minister of Civil Aviation on July 30th, 1952, to allow, at the discretion of the Corporation, in addition to traffic stops already authorised, an additional traffic stop at Baghdad on those services, and also for an amendment to the normal scheduled service which they operate on the route set out as Route No. 4 to allow traffic stops at Calcutta and/or Dacca.

APPLICATION No. 293, from Silver City Airways, Ltd., of 1 Great Cumberland Place, London, W.1, for an all-freight service for the carriage of freight, including vehicles, together with attendants where necessary, between Blackbushe, Ferryfield or Southampton (Eastleigh) in the U.K., and in or all of the following traffic points: Calais, Le Touquet, Lille, Metz, Gros Tenguin, Ostend, Brussels, Leige, Charleroi, Luxembourg, Eindhoven, Ypenburg, Leeuwarden, Twente, Amsterdam, Hamburg, Bremen, Hanover, Cologne, Dusseldorf, Frankfurt, Gutesloh, Buckeburg, Wildenrath, Sonderborg, Odense, Nakskov, Copenhagen, Basle, Malmo. The Company ask to operate with Bristol 170 and Dakota aircraft, and later possibly with Blackburn Universal aircraft, at a frequency of from one to three services daily for a period of seven years from about six months after the date of approval.

THESE applications will be considered by the Council under the Terms of Reference issued to them by the Minister of Civil Aviation on July 30th, 1952. Any representations or objections with regard to these applications must be made in writing, stating the reasons, and must reach the Council within 14 days of the date of this advertisement, addressed to the Secretary, Air Transport Advisory Council, 9 Buckingham Gate, London, S.W.1, from whom further details of the applications may be obtained. When an objection is made to an application by another air transport company on the grounds that they are applying to operate the route or part of route in question, their application, if not already submitted to the Council, should reach them within the period allowed for the making of representations or objections. [2155

PUBLIC APPOINTMENTS

COMMONWEALTH OF AUSTRALIA

Department of Supply

AERONAUTICAL RESEARCH LABORATORIES FISHERMEN'S BEND, VICTORIA

APPLICATIONS are invited for the position of scientific officer, Grade 3.

SALARY: £1,154 to £1,262 per annum.

DUTIES: Position No. 239. Under the direction of senior scientific officer to work on the aerodynamic development and research relating to new types of aircraft and missiles and to general problems in low-speed aerodynamics.

QUALIFICATIONS: University degree of high standard in aeronautical engineering or equivalent qualifications. Several years' experience in wind tunnel investigations related to the aerodynamic development of aircraft and missiles.

THE salaries quoted are Australian currency.

WHERE permanent appointment is accepted the successful applicant will be eligible to become a contributor to the Commonwealth Superannuation scheme.

UNDER specified conditions, first class boat fare (if first class berth available) of the appointee and his dependants (wife and dependent children) will be paid by the Commonwealth.

FURTHER information and application forms may be obtained from

SENIOR REPRESENTATIVE (A.P.17),
Department of Supply,
Australia House,
London, W.C.2.

with whom applications must be lodged by June 22nd, 1954. [2137

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PUBLIC APPOINTMENTS

WANTED FOR

HINDUSTAN AIRCRAFT LTD.

BANGALORE, MYSORE STATE, SOUTH INDIA

(a) **Manufacturing Superintendent**
(b) **Chief Equipment, Jig and Tool Planner and Designer**

APPLICANTS for each of these two positions must
(a) have held equivalent posts for at least 10 years in large concerns in U.K. or other Western countries.
(b) be thoroughly conversant with modern estimating, planning and production methods and manufacturing equipment employed in aircraft and/or aero engine manufacture.

APPLICATIONS should give full details of nationality, age, whether married or single, chronological history of education, former posts and present post held, giving approximately the number of employees of employer firms and number of persons for whom applicant was personally responsible, and details of salaries received. Applicants should state engineering degrees obtained and/or membership of recognised engineering institutions.

PROPOSED consolidated salaries, inclusive of all allowances, are:—
(a) Manufacturing Superintendent £2,250-£2,500.
(b) Chief Equipment, Jig and Tool Planner and Designer £2,000-£2,250.

SALARY level may be adjusted according to ability and experience of successful applicants.

EARNINGS and allowances will be paid in rupees and be subject to Indian income tax.

THE appointments will be for a three-year period.

FREE Single 1st-class return passage by sea, or air passage, for self and wife will be provided by the company.

LOCAL leave (1/11th of the period spent on duty).

SICK leave (15 days per year) and Casual leave (12 days per year) will be included in terms of contract. Also Home leave of 3 months for the entire contract period will be allowed at the end of, but not during, the contract period.

REFERENCES from reputable persons engaged in the industry will be required. Applications will be treated as confidential.

FORMS of application may be obtained, on application by postcard, quoting No. 6/4 E, from the High Commission of India, General Department, Aldwych, London, W.C.2. Last date for receipt of applications June 30th, 1954. [2119

COMMONWEALTH OF AUSTRALIA

Department of Supply

DEFENCE STANDARDS LABORATORIES MARIBYRNONG, VICTORIA

Principal Scientific Officer (Physiologist)
(Temporary Position No. 62)

SALARY: £1,688/£1,874 per annum.

DUTIES: Establish and take charge of new Physiological Section. Work is of a research and investigational nature.

QUALIFICATIONS: University degree in medicine, or appropriate degree in science. Experience in experimental physiological techniques essential.

THE salary quoted is Australian currency.

WHILST the position is a temporary one, the tenure of employment is not limited.

UNDER specified conditions, first-class boat fare (if first-class berth available) for the appointee and dependants (wife and dependent children) will be paid by the Commonwealth.

APPLICATION forms available from:—

SENIOR REPRESENTATIVE (A.P.18),
Department of Supply,
Australia House,
Strand,
London, W.C.2.

with whom applications must be lodged by June 24th, 1954. [2150

TIME RECORDERS

STAFF time checking and job costing time recorders. All makes for quick cash sale. Exceptional condition.—British Time Recorder Co., Ltd., 149 Farringdon Road, E.C.1. [2138

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WE offer all courses appertaining to pilot/navigator licences. Multicolour lithograph presentation of lecture precis to I.C.A.O. standards.

LINK training dept. situated centrally in London. Full briefing for instrument rating 25/- per hour. Block rate, 10 hours, reduces to 22/6. [0248

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Supervisory positions available in the design staff of a progressive and expanding Canadian Aircraft Company.

SECTION CHIEF—ELECTRONICS

Salary range $9000-$10,000 p.a.

Responsibility Reports to Chief Design Engineer, determination of design policy, making major design decisions and the organization and direction of a team engaged in the design of radio, radar and electronics installations and systems for a broad field of military aircraft.

Education Engineering degree or Higher National standard in appropriate field.

Experience Twelve years experience, of which at least four years have been spent in a senior supervisory capacity, with modern military aircraft electronic systems. Experience in the field of anti-submarine installations is particularly desirable and other related experience will be evaluated in the light of its applicability.

GROUP LEADER—ARMAMENT

Salary range $8000-$9000 p.a.

Responsibility Reports to Section Chief. Organization and direction of team engaged in the design of armament installations and systems in a broad field of military aircraft.

Education Engineering degree or Higher National standard in mechanical engineering.

Experience Ten years experience, of which at least three should have been in a recognized supervisory capacity, in the field of gun turret, bomb and rocket systems and installation. Experience in the field of anti-submarine aircraft is desirable and other related experience will be evaluated in the light of its applicability.

- Five day week.
- Retirement pension plan.
- Group insurance benefits.
- Moving allowance.

Letters of application should include complete details of your education and experience and at least three references.

Reply to:—

J. H. DAVIS
European Representative-Canadair Ltd.
c/o The Canadian Department of Labour
61 GREEN STREET, LONDON W.1

Please mark application "SUPERVISOR"

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LINK training at £1 per hour. Courses of instruction up to instrument rating standard.—Airways Aero Associations, Ltd., Room 118, Croydon Airport. Tel.: Croydon 7744, Ext. 200. [0706

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SITUATIONS VACANT

The engagement of persons answering these advertisements must be made through the local office of the Ministry of Labour and National Service, etc., if the applicant is a man aged 18-64 or a woman aged 18-59 inclusive, unless he or she or the employer is excepted from the provisions of The Notification of Vacancies Order 1952.

SAUNDERS-ROE, LIMITED

have
vacancies
for

SENIOR STRESSMEN (2)

APPLICANTS should have engineering degrees or the equivalent and five years' aircraft experience.

AERODYNAMICISTS (2)

APPLICANTS should be between 28 and 30 years of age and have engineering degrees or the equivalent and experience in the aircraft industry.

DRAUGHTSMEN

Aircraft experience desirable.

GOOD working conditions. Staff assurance and pension schemes. Practical assistance with housing.

EXPERIENCED engineers interested in obtaining employment in the Isle of Wight are invited to write, stating age, experience, etc., and quoting Ref. F/7 to the Personnel Officer, Saunders-Roe, Ltd., East Cowes, Isle of Wight. [2135

GUIDED WEAPONS

The Guided Weapons Department of

VICKERS-ARMSTRONGS LIMITED

WEYBRIDGE, SURREY

has vacancies for the following Staff:—

GRADUATE ENGINEERS, with degrees in Engineering, Physics or Mathematics, and 3 to 5 years experience in one of the following categories:—

E.1. Design and development of high-pressure hydraulic or pneumatic systems and components.

E.2. Development of techniques for vibration and/or climatic testing as applied to electronic equipment and design of associated test gear.

E.3. Development work on reinforced plastics.

E.4. Design of missile autopilots, simulators and computors.

E.5. Design of U.H.F. and micro-wave transmitters and receivers.

E.6. Design of transformers and magnetic amplifiers, with good general knowledge of electrical properties of materials.

E.7. Design of electronic circuits and servo mechanisms.

E.8. Engineering development of missile electronic equipments.

TECHNICAL ASSISTANTS, with degree, Higher National Certificate or equivalent, and experience in one of the following categories:—

T.1. Development and test of high-pressure hydraulic or pneumatic systems and components.

T.2. Environmental testing of missile components.

T.3. Manufacture of prototype missile electronic equipments to M.O.S. specifications.

T.4. Manufacture of reinforced plastic components and potting of electronics.

T.5. Development and test of intrumentation for missile trials.

T.6. Development of missile autopilots and analogue computors.

LABORATORY ASSISTANTS, preferably with O.N.C. or equivalent.

L.1. Assembly, test, and maintenance of hydraulic and pneumatic systems and components.

L.2. Drawing and constructing tests rigs used for mechanical and environmental testing.

L.3. Manufacture of prototype electronic equipment and electro-mechanical devices. Layout and wiring from circuit diagrams and sketches, chassis work and simple machining.

DRAUGHTSMEN, with 2 years' experience or more as follows:—

D.1. Design of ground airborne or missile types of radar equipment.

D.2. Design of small mechanisms such as missile autopilots, and electro-mechanical computors embodying gyroscopes, accelerometers, small motors, gearboxes, etc.

Apply to Employment Manager,

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(AIRCRAFT DIVISION)

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giving full particulars and quoting reference EO/G.W./ reference number above.

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Additional buses operate to and from the Works at starting and finishing times.

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have vacancies in their Design Office as under:—

1 SENIOR DESIGNER with experience of fuel systems. Capable of taking control of fuel unit Section.

1 WEIGHT ESTIMATOR

1 MODIFICATION DRAUGHTSMAN

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DETAIL DRAUGHTSMEN

The work is of a progressive nature, connected with fuel systems for gas turbines, ram jets, and rocket motors, as well as hydraulic flying control equipment for aircraft and guided missiles.

Good salaries offered

Out-of-pocket expenses paid to applicants attending interviews.

Apply, stating experience, age and salary required, to:—

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HOBSON WORKS
FORDHOUSES
WOLVERHAMPTON, STAFFS

SILVER CITY AIRWAYS

HERMES FLEET

have the following immediate staff vacancies for employment at their Blackbushe Airport Maintenance Base:

Licensed Aircraft Engineers with current Multi-Engine Aircraft, Engine Endorsements preferably including Hercules 734 Engines.
Licensed Electrical Engineers
Licensed Instrument Engineers
Planning Engineers
Progress Chasers
Technical Records Clerks

Vacancies also exist for experienced **Airframe/Engine Fitters** with recent experience on Hermes or similar Multi-Engine Aircraft.
Storekeepers
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FREIGHTER FLEET

A limited number of vacancies exist for **Licenced Airframe/Engine Engineers** with Freighter Endorsement, for employment at Lympne and Ferryfield Airports.

Applications in writing, giving full details of qualifications and experience to:

Engineering Superintendent,
SILVER CITY AIRWAYS,
BLACKBUSHE AIRPORT,
CAMBERLEY, Surrey.

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Expanding

Gas Turbine Activities

of

D. NAPIER & SON, LTD.

demand the appointment of

ENGINEERS

both junior and senior, for design, development, research, production and testing.

APPLICATIONS from men with experience in any of the following will be particularly welcome:—

Weight Control
Stress Calculation
Forward Project Design
Blade Design
Control Systems
Full-scale Engine Design
Engine Test Administration
Performance Analysis and Report Writing
Vibration Investigation
Failure Investigation
Engine Build Specification Research
Jig and Tool Design
(only senior positions)
Planning
New Process Development
(particularly sheet metal fabrication)
Test Plant Design

Applications should be addressed to:—
CENTRAL PERSONNEL SERVICES,
336-7 Strand, W.C.2.
Quoting reference S.A.30H
Saturday morning interviews can be arranged in London or, in special cases, near the applicants' homes. [2056

SAUNDERS-ROE, LIMITED

have vacancies for

STRESS ENGINEERS
AERODYNAMICISTS

and

DRAUGHTSMEN

for

Aircraft Design
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Full-scale Layout

THE Company would be pleased to hear from experienced engineers interested in employment in the Isle of Wight.
THERE are pension and assurance schemes and practical assistance with housing will be given to successful applicants.
APPLY, stating age, experience, salary, etc., and quoting Ref. P/3 to the Personnel Officer, Saunders-Roe, Ltd., East Cowes, I.W. [2136

GRADUATE OR CHARTERED ELECTRICAL AND MECHANICAL ENGINEERS

required by

THE ENGLISH ELECTRIC CO., LTD., LUTON

for work on

GUIDED WEAPONS

in Project Co-ordination Department.

EXPERIENCED development engineers and technical assistants wishing to broaden and gain experience in this type of work are invited to apply. Experience in aircraft industry an advantage, but not essential.
POSITIONS are permanent and progressive, carry attractive salaries for right men, with staff pension after qualifying period. Reply to Dept. C.P.S., 336/7 Strand, W.C.2, quoting Ref. S.A.26H. [2127

SIR W. G. ARMSTRONG WHITWORTH AIRCRAFT, Ltd., have vacancies for the following qualified engineers for flight trials work on guided missiles:—
(1) Electronic engineers with University degree or equivalent qualification. Experience on electronic experimental work or Service experience on radio or radar is essential. Age limits 27-38 years.
(2) Mechanical engineer with experience on vibration testing or similar work.
APPLICATIONS giving particulars of qualifications and experience should be addressed to: The Chief Engineer, Armaments Division, Sir W. G. Armstrong Whitworth Aircraft, Ltd., Baginton, Coventry. [2003

D. NAPIER & SON LTD.

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have a vacancy

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SENIOR PROJECT DESIGNER

with experience in Aero Gas Turbines and Piston Engine Fields. High salary offered for the right experience. Please reply giving details of previous experience to **Dept. C.P.S. 336/7 Strand, W.C.2,** quoting Ref. 1315.

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For a wide range of interesting High Priority Experimental and Development Work

EXCELLENT POSTS FOR KEEN MEN WITH B.Sc. or A.F.R.Ae.S.

or equivalent qualifications

Please write stating age, experience and salary required to:-

THE CHIEF TECHNICIAN
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AIR TRAINERS LTD.

Invite applications for a number of senior grade posts at their Aylesbury, Buckinghamshire, factory. Immediate requirements are for:—

MECHANICAL DESIGNERS
for work on mechanical design of servo mechanisms in connection with flight simulators. Some knowledge of electronics an advantage. Only men with proved design ability considered.

SENIOR DRAUGHTSMEN, MECHANICAL,
for work on flight simulators. Preferably with experience on light mechanisms.

APPLICANTS SHOULD WRITE FULLY STATING AGE, EXPERIENCE AND WHEN AVAILABLE FOR INTERVIEW, TO

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SITUATIONS VACANT

THE COLLEGE OF AERONAUTICS

APPLICATIONS are invited for the post of lecturer in flight experiments. Applicants, who will be expected to fly as observer, must have had practical experience of planning flight tests and reduction of results. Preference will be given to those holding a degree in science or engineering and with flight research experience. Salary within the range of £600 to £1,000 per annum, depending upon qualifications and experience, with superannuation under F.S.S.U. and family allowance. It is the policy of the College that lecturers shall if they wish reside in College, and it is intended that a small house at a nominal rental shall be made available as soon as possible if the successful applicant is married.—Applications, giving full details of qualifications and experience, and quoting the names of three referees, should be addressed to the Recorder, The College of Aeronautics, Cranfield, Bletchley, Bucks. Further particulars available. [2141

THE COLLEGE OF AERONAUTICS

APPLICATIONS are invited for the post of senior lecturer in flight experiments. Applicants should have wide experience of flight testing and flight research techniques. The successful applicant will be expected to supervise all teaching within the department and to supervise and co-ordinate flight research within the College. Salary within the range of £1,000 to £1,400 per annum depending upon qualifications and experience, with superannuation under F.S.S.U. and family allowance. If the successful applicant is married, a house at a nominal rental will be available.—Applications, giving full details of qualifications and experience and quoting the names of three referees, should be addressed to the Recorder, The College of Aeronautics, Cranfield, Bletchley, Bucks. Further particulars available. [2140

AERODYNAMICISTS

A RAPIDLY expanding precision instrument manufacturing firm holding long-term design and development contracts has the following vacancies:

(a) Senior aerodynamicist with experience of dynamic stability analysis in connection with the design and development work of autopilots. Knowledge of servo mechanisms an advantage. Position offers exceptional opportunity for the right man. Ref. S.E./2.
(b) Young graduates and personnel with equivalent professional qualifications for training in the above field. Ref. G.E./2.

PLEASE forward full details of career and salary required (which will be treated in strict confidence), quoting appropriate reference, to Box 4582. [2164

ELECTRICAL DRAUGHTSMEN

APPLICATIONS invited from senior draughtsmen for work on aircraft electrical installations, especially wiring diagrams. Reasonable commencing salaries according to experience. Superannuation. Write fully to Personnel Supervisor,

HAWKER AIRCRAFT, LTD.,
Kingston-on-Thames,
Surrey. [2132

AIRCRAFT PROJECT DESIGNER

AN aircraft project designer with first-class qualifications is required by an established company to undertake a new and interesting design project. At least seven years' experience in an aircraft design office is an essential qualification, preferably backed by a good engineering degree.

APPLICATIONS, which will be treated in strict confidence, should state full details of past experience, age and salary required, to Box 5842. [2160

ARMSTRONG SIDDELEY MOTORS, COVENTRY

A VACANCY exists in the Instrument Section for an engineer to develop improved methods of instrumentation for the flight testing of gas-turbine aero engines. Some knowledge of electronics is desirable, though not essential.—Apply to Reference TGD, Personnel Manager, Armstrong Siddeley Motors, Coventry. [2153

INSTALLATION draughtsman.

AN opportunity occurs for a young, fully experienced draughtsman to undertake the design of experimental radio and electronic installations in modern aircraft of various types.

STRESSMAN.

A SIMILAR vacancy occurs for a stressman to work on the same and associated projects.

THIS is an excellent opportunity for men with experience in this field to join a small expanding drawing office in an established company in Buckinghamshire.

WRITE, giving full particulars of age, qualifications and experience, to Airtech, Ltd., Aylesbury, and Thame Airport, Haddenham, Bucks. [2152

SITUATIONS VACANT

A- AND C-licensed engineer required for Rapide and Anson aircraft.—Write: Republic Air Charters, Shannon Airport, Limerick, Eire. [0072

DESIGNER-DRAUGHTSMAN, section leader status, with design experience of small hydraulic cylinders and controls, for development and application of equipment for the heavy automobile and similar fields. Knowledge of road vehicles an advantage. Also competent draughtsman for similar work.—Write, in confidence, with full details of qualifications, experience, personal particulars and salary required, to Chief Engineer, Clayton Dewandre Co., Ltd., Titanic Works, Lincoln. [2139

THE DUNLOP RUBBER CO. LTD.,
AVIATION DIVISION, COVENTRY

requires

SENIOR DESIGN DRAUGHTSMEN

capable of carrying projects through from conception to completion.

Also

JUNIOR DETAIL DRAUGHTSMEN

and

SENIOR AND JUNIOR STRESSMEN

Experience of light hydraulic and pneumatic equipment would be advantageous.

The company's programme offers excellent prospects of permanent interesting employment under congenial working conditions.

Salary will be commensurate with qualifications and experience, full details of which should be sent to:—

THE LABOUR MANAGER,
DUNLOP RUBBER CO. LTD.,
AVIATION DIVISION,
FOLESHILL, COVENTRY

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AIRPORT WORKS

Required for Cambridge

SKILLED AIRFRAME FITTERS AND RIGGERS
AIRCRAFT DETAIL FITTERS
SHEET METAL WORKERS

Subsistence allowances to approved applicants. Comfortable single or double cubicle Hostel Accommodation at Works, or Private Lodgings available nearby Housing Estates on City bus route.

also

SKILLED AIRFRAME FITTERS

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Generous Subsistence Allowances.

Write, call or 'Phone, Employment Officer,
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Fitted fully approved hopper, ready for topdressing operations.
C.I.F. Quotations per return.
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CROYDON AIRPORT, SURREY, ENGLAND
Cables: MUIRAIR, CROYDON

SITUATIONS VACANT

FERRANTI, Ltd., have vacancies in their aircraft section at Turnhouse Airfield for the following personnel:

(1) Radio/radar mechanic. Practical experience in servicing, installation and workshop practice of aircraft airborne radio/radar equipment essential. A licence an advantage but not essential. Ref. ARM/TID.
(2) Aircraft electrical fitter, should have experience in aircraft installation, repairs and workshop practice. Preference will be given to applicants with experience of mains power supplies. Ref. AEF/TID.

APPLY in writing, quoting appropriate reference, and giving full details of qualifications and past experience, to the Personnel Officer, Ferranti, Ltd., Ferry Road, Edinburgh 5. [2142

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DRAUGHTSMAN required for work on aircraft components. Experience in the aircraft industry desirable, but not essential; good mechanical engineering draughtsman will be considered. Capable of working with the minimum of supervision. Write, giving particulars of age, experience and technical qualifications, to: King Aircraft Corporation, Fifth Street, Montrose Avenue, Hillington, Glasgow, S.W.2. [1933

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MINISTRY of Transport and Civil Aviation. Senior inspector of accidents. Applications are invited from men for one post in the Civil Aviation Accidents Investigation Branch. H.Q. in London but duties involve investigations in any part of the world. Age at least 30 on May 1st, 1954. Candidates must be of good education, able to compile technical reports and have sound knowledge of engineering, particularly in aeronautics. They must have or have held an airline transport pilot's licence, commercial pilot's licence or equivalent pilot's "B" licence and considerable flying experience, with not less than 1,000 hours as pilot-in-charge. Total remuneration for 45½-hour week £1,361 rising to approximately £1,550. Post is unestablished but has long-term possibilities.—Application forms and particulars from Ministry of Transport and Civil Aviation, Establishments (Staffing B.1, Room 6057, Berkeley Square House, London, W.1. Application forms to be returned by June 30th, 1954. [2144

THE Engine Division of the Bristol Aeroplane Company Limited has vacancies at Bristol for technical assistant, age 25-35, for drawing up and issuing build instructions to the shops and general liaison with shops. Qualifications: Engineering apprenticeship up to H.N.C. standard and experience in shops or drawing office. Also technical engineer for home and outside duties in the Ramjet Development Department, age 25-35, with practical experience of aero engine testing, installation or flight development. Qualifications: H.N.C. or B.Sc. degree or Aircraft Maintenance Engineers Licences in categories C. or D. Good working conditions, pension scheme and welfare facilities.—Applications, giving details of age, qualifications and experience, and quoting ED.1, should be sent to The Personnel Manager, The Bristol Aeroplane Company Limited, Engine Division, Filton House, Bristol. [2128

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INDEPENDENT air transport company requires administrative executive at their main base near London. The position includes supervision of aircrew and aircraft rostering and records, operations statistics, etc. Knowledge of air transport statutory requirements desirable, and some experience on technical side of aircraft operations an advantage. Position requires energetic person with organising ability and strong commercial outlook.—Write Box 5812. [2146

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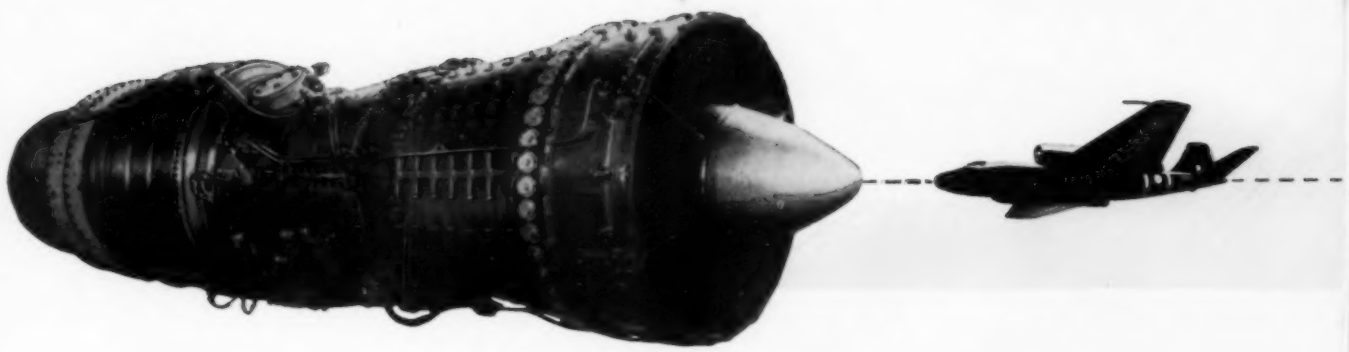

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